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Part II

Environmental Protection Agency

40 CFR Parts 261, 271, and 302
Hazardous Waste Management System; Carbamate Production Identification and Listing of Hazardous Waste; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 261, 271, and 302

[SWH–FRL–4834–9]

RIN 2050–AD59

Hazardous Waste Management System; Carbamate Production Identification and Listing of Hazardous Waste; and CERCLA Hazardous Substance Designation and Reportable Quantities

AGENCY: Environmental Protection Agency.

ACTION: Notice of proposed rulemaking.

SUMMARY: The U.S. Environmental Protection Agency (EPA) is proposing to amend the regulations for hazardous waste management under the Resource Conservation and Recovery Act (RCRA) by listing as hazardous six wastes generated during the production of carbamates, to exempt one of these wastes from the definition of hazardous wastes, if it is demonstrated that hazardous air pollutants are not being discharged or volatilized during waste treatment, and to exempt biological treatment sludges generated from the treatment of one of these wastes provided the sludges are not characteristically hazardous. The Agency is also proposing to add 4 generic groups and 70 specific chemicals to the list of commercial chemical products that are hazardous wastes when discarded. Also, EPA is proposing not to list as hazardous certain wastes generated during the manufacture of carbamates. This action proposes to amend the basis for listing hazardous waste by adding the six wastes and hazardous constituents found in the wastes on which the listing determinations are based, and to add 78 compounds to the list of hazardous constituents.

This action is proposed under the authority of under sections 3001(e)(2) and 3001(b)(1) of the Hazardous and Solid Waste Amendments of 1984 (HSWA), which direct EPA to make a hazardous waste listing determination for carbamate wastes. The effect of this proposed regulation, if promulgated, is that these wastes will be subject to regulation as hazardous wastes under subtitle C of RCRA. Additionally, this action proposes to designate the wastes proposed for listing as hazardous substances subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). EPA is not taking action at this time to adjust the one-pound statutory reportable quantities (RQs) for these substances.

DATES: EPA will accept public comments on this proposed rule until May 2, 1994. Comments post-marked after this date will be marked "late" and may not be considered. Any person may request a public hearing on this proposal by filing a request with Mr. David Bussard, whose address appears below, by March 15, 1994.

ADDRESSES: The official record of this rule-making is identified by Docket Number F–94–CPLP–FFFFF and is located at the following address. The public must send an original and two copies of their comments to: EPA RCRA Docket Clerk, room 2616 (5305), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

Copies of materials relevant to this proposed rulemaking are located in the docket at the address listed above. The docket is open from 9 a.m. to 4 p.m., Monday through Friday, excluding Federal holidays. The public must make an appointment to review docket materials by calling (202) 260–9327. The public may copy 100 pages from the docket at no charge; additional copies are $0.15 per page.

Requests for a hearing should be addressed to Mr. David Bussard at: Characterization and Assessment Division, Office of Solid Waste (5304), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

FOR FURTHER INFORMATION CONTACT: The RCRA/Superfund Hotline, toll-free, at (800) 424–9346 or at (703) 920–9810. The TDD Hotline number is (800) 553–7672 (toll-free) or (703) 486–3323 in the Washington, DC metropolitan area. For technical information on the RCRA hazardous waste listings, contact John Austin, Office of Solid Waste (5304), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC, 20460, (202) 260–4789.

For technical information on the CERCLA aspects of this rule, contact: Ms. Gerain H. Perry, Response Standards and Criteria Branch, Emergency Response Division (5202G), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, (703) 603–8760.

SUPPLEMENTARY INFORMATION: The contents of the preamble to this proposed rule are listed in the following outline:

I. Legal Authority

These regulations are being promulgated under the authority of sections 2002(a) and 3001(b) and (e)(1) of the Solid Waste Disposal Act, as amended, 42 U.S.C. 6912(a), and 6921(b) and (e)(1), (commonly referred to as RCRA), and section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9602(a).

II. Background

A. Introduction

As part of its regulations implementing Section 3001(e) of the Resource Conservation and Recovery

Act of 1976, as amended (RCRA), EPA published a list of hazardous wastes that includes hazardous wastes generated from specific sources. This list has been amended several times, and is published in 40 CFR 261.32. In this action, EPA is proposing to amend this section to add six wastes generated during the production of carbamate chemicals. In addition, under the authority of section 3001 of RCRA, EPA has promulgated in 40 CFR 261.33 a list of commercial chemical products or manufacturing chemical intermediates that are hazardous wastes if they are discarded or intended to be discarded. In this action, the Agency is proposing to add four generic and 70 specific materials to this list.

All hazardous wastes listed under RCRA and codified in 40 CFR 261.31 through 261.33, as well as any solid waste that exhibits one or more of the characteristics of a RCRA hazardous waste (as defined in 40 CFR 261.21 through 261.24), are also hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. See CERCLA section 101(14)(C). CERCLA hazardous substances are listed in Table 302.4 at 40 CFR 302.4 along with their reportable quantities (RQs). Accordingly, the Agency is proposing to list the proposed wastes in this action as CERCLA hazardous substances in Table 302.4 of 40 CFR 302.4. EPA is not taking action at this time to adjust the one-pound statutory RQs for these substances.

The following discussion briefly summarizes prior regulatory actions affecting wastes from the carbamates industry, and presents an overview of the industry.

B. Previous Listings

A number of carbamate products and wastes have previously been listed as hazardous wastes when discarded. The Agency notes that neither the scope of the existing hazardous waste listings (described below) nor their regulation under CERCLA are affected in any way by this proposal. EPA is not soliciting comments concerning these listings and does not intend to respond to any such comments received.

The following carbamate wastes from the production of ethylenebisdithiocarbamic acid (EBDC) and its salts have already been listed as hazardous wastes based on the presence of the carcinogen ethylene thiourea (ETU) in the wastes (51 FR 37725, October 24, 1985):

K123—Process Wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.

K124—Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts.

K125—Purification solids (including filtration, evaporation, and centrifugation solids) from the production of ethylenebisdithiocarbamic acid and its salts.

K126—Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts.

In addition, EPA has promulgated in 40 CFR 261.33 a list of commercial chemical products or manufacturing chemical intermediates that are hazardous wastes if they are discarded or intended to be discarded which includes the carbamate materials listed in Table 1.

TABLE 1.—CARBAMATE HAZARDOUS WASTE LISTINGS

Waste No.	Name(s) used in CFR	CAS No.
P045	2-Butanone, 3,3-dimethyl-1- (methylthio)-, O- [(methylamino)- carbonyl] oxime	391696–18–4
P070	Aldicarb	116–06–3
P066	Methomyl	16752–77–5
U062	Diallate Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2- propenyl) ester	2303–16–4
U114	Carbamothioic acid, 1,2-ethanediylbis- salts and esters Ethylene bisdithiocarbamate acid, salts, & esters	1111–54–6a
U178	Carbamic acid, methylnitroso-, ethyl ester	615–52–2
U238	Carbamic acid, ethyl ester Ethyl carbamate	51–79–6
U244	Thiram	137–26–8

[1] CAS number given for parent compound only.

In addition, EPA classified certain carbamate products and wastes as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. CERCLA hazardous substances are listed in Table 302.4 at 40 CFR 302.4 along with their reportable quantities (RQs) and include the carbamate wastes in Table 2.

TABLE 2.—LIST OF CURRENTLY REGULATED CARBAMATE CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

Hazardous substance	CAS No.	Final RQ (lbs)
Aldicarb	116–06–3	1
Carbaryl	63–25–2	100
Carbofuran	1563–66–2	10
Diallate	2303–16–4	100
Ethyl carbamate	51–79–6	100
Ethylene- bisdithiocarbamic acid, salts & esters	111–54–6	5000
Methomyl	16752–77–5	100
Methiocarb	2032–65–7	10
Mexacarbate	315–18–4	1000
Thiofanox	39196–18–4	100
Carbamic acid, methylnitroso-, ethyl ester	615–3–2	1
Thiram	137–26–8	10
Triethylamine	121–44–8	5000
K123		10
K124		10

TABLE 2.—LIST OF CURRENTLY REGULATED CARBAMATE CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous substance	CAS No.	Final RQ (lbs)
K125		10
K126		10

C. Previous Proposed Listings

The carbamates listed in Table 3 were proposed to be included in the list of commercial chemical products or manufacturing chemical intermediates that are hazardous wastes if they are discarded or intended to be discarded under 40 CFR 261.33 (49 FR 49784, December 21, 1984). These carbamate listings were proposed in response to a petition by the State of Michigan to include 109 chemicals to the lists in 40 CFR 261.33. This rule was never finalized. Today the Agency is reproposing a number of carbamate chemicals, that were also part of the Michigan petition. EPA is not soliciting comments concerning any other compounds contained in the December 21, 1984, notice and does not intend to respond to any such comments received.

TABLE 3.—1984 PROPOSED CARBAMATE HAZARDOUS WASTE LISTINGS

Proposed waste No.	Name(s) used in FR	CAS No.
P127	Carbofuran	1563–66–2
P128	Mexacarbate	315–18–4
U271	Benomyl	17804–35–2
U277	Sulfallate	95–06–7
U278	Bendiocarb	22781–23–3
U279	Carbaryl	63–25–2
U280	Barban	101–27–9
U336	Ziram	137–30–4

Additionally, a number of acutely toxic carbamate products have been proposed under section 302(A)(2) of the Superfund Amendments and Reauthorization Act of 1986 (SARA) as Extremely Hazardous Substances for addition to Table 302.4 at 40 CFR 302.4 along with their reportable quantities (RQs). These carbamate compounds are listed in Table 4. The Extremely Hazardous Substances Proposal (54 FR 3388, January 23, 1989) has also not been promulgated. The Agency requests additional comment only for those carbamates listed in Table 4, which were previously proposed only for addition to Table 302.4. The Agency does not intend to respond to comments received on other constituents in the January 23, 1989, notice.

TABLE 4.—PROPOSED EXTREMELY HAZARDOUS SUBSTANCES AND PROPOSED RQS

CAS No.	Chemical name (common name)	Proposed RQ pounds
26419–73–8	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)carbonyl]oxime (Tirpate)	1
57–64–7	Benzoic acid, 2-hydroxy, compd. with (3aS-cis)- 1,2,3,3a,8,8a-hexahydro-1,3a,8- trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostimigine salicylate).	1
119–38–0	Carbamic acid, dimethyl-, 3-methyl-1-(1- methylethyl)-1H-pyrazol-5-yl ester (Isolan)	1
1129–41–5	Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb)	1
644–64–4	Carbamic acid, dimethyl-,1- (dimethylamino)carbonyl)-5-methyl-1H-pyrazol-3- yl ester (Dimetilan)	1
23135–22–0	Ethanimidothioic acid, 2-(dimethylamino)-N- [[methylamino carbonyl] oxy]-2-oxo-, methyl ester (Oxamyl)	1
17702–57–7	Methanimidamide, N,N-dimethyl-N′-[2-methyl-4- [[(methylamino)carbonyl]oxy]phenyl]- (Formparanate)	1
23422–53–9	Methanimidamide, N,N-dimethyl-N′-[3- [[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride).	1
64–00–6	Phenol, 3-(1-methylethyl), methyl carbamate (UC 10854)	1
2631–37–0	Phenol, 3-methyl-5-(1-methylethyl)-methyl carbamate (Promecarb)	1
57–47–6	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a- hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)- (Physostigmine).	1

D. Description of the Industry

The U.S. carbamates manufacturing industry is a very diverse industry in both products manufactured and companies that make up the industry. The carbamates manufacturing industry is made up of four major classes of compounds with distinct functional characteristics. These include carbamates, carbamoyl oximes, thiocarbamates, and dithiocarbamates.

In 1990, the carbamate industry in the U.S. was composed of 64 chemical products produced by 20 manufacturers at 24 facilities. The majority of the carbamate manufacturers are located in the eastern half of the United States with only four facilities located west of the Mississippi River. There are carbamate manufacturers located in 13 states. The total domestic production of carbamates in 1990 was approximately 112,000 metric tons (MT). In 1990, individual carbamate products were manufactured at a rate of between 2.5 and 14,000 metric tons per year. Carbamates are manufactured at very different rates depending on the type of product. Typically, dithiocarbamates are produced in smaller quantities than other classes of carbamates. Based on

the results of EPA's RCRA § 3007 survey, the typical carbamate facility manufactures one carbamate product or one chemical class of carbamate products. Of the 24 carbamate manufacturing facilities 14 produce only dithiocarbamates. Five of these 14 only produce one dithiocarbamate product. Of the remaining ten carbamate manufacturers 5 produce one carbamate product. Three of the remaining 5 manufacturers produce a single class of carbamates (e.g., carbamate, carbamoyl oxime, or thiocarbamate) and 2 produce more than one class of carbamate. Carbamate products are widely used as active ingredients in pesticides (i.e., herbicides, insecticides, and fungicides). Dithiocarbamates are also manufactured for use in the rubber processing industry as rubber accelerators. Uses have also been found for carbamates in the wood preserving and textiles industries.

The commercial manufacture of carbamates currently includes five chemical reaction processes: (1) Reaction of an isocyanate with an alcohol to form a carbamate, (2) reaction of an amine and a chloroformate to form a carbamate, (3) reaction of an isocyanate and an organic oxime to form a carbamoyl oxime, (4) reaction of an organic chlorothioformate and an amine to form a thiocarbamate, and (5) the reaction of an amine with carbon disulfide in the presence of a metal salt to form a dithiocarbamate. The primary raw materials used in the production of these products will vary depending on the final product. The Carbamate Background Document [1] (available in the RCRA Docket at EPA Headquarters—see ADDRESSES section) and the sources cited therein describe these production processes more thoroughly.

Most carbamate, carbamoyl oxime, and thiocarbamate facility operations are organized along similar process lines with a carbamate intermediate preparation phase (e.g. alcohol or oxime), the carbamolation step, and product and reactant recovery phase. Dithiocarbamate production facilities are generally run as batch operations where the reactants are put into a stirred reaction vessel and allowed to come to reaction completion. Facilities typically operate with a common wastewater treatment plant for all facility operations.

[1] The Background Document consists of Engineering Analysis of the Production of Carbamates, Carbamate Waste Listing Support: Health Effects Background Document, Assessment of Risks from the Management of Carbamate Wastes, and other supporting documents. Because of the confidential nature of the information in the Engineering Analysis, it has been classified as Confidential Business Information (CBI), and is not available to the public. However, a concise summary of this document has been assembled for the public docket. EPA's procedures governing the handling of information claimed as confidential, including procedures for challenging a CBI determination are found at 40 CFR Part 2.

III. Summary of the Proposed Regulation and Request for Comments

A. Overview of the Proposal

Under section 3001(e) of RCRA, EPA must make listing determinations on wastes generated by specific industries, including the carbamate industry. The carbamate industry can be divided into three major segments that include carbamates and carbamoyl oximes, thiocarbamates, and dithiocarbamates. This rule, if finalized, will satisfy the section 3001(e) requirement to make hazardous waste listing determinations for wastes from the carbamate industry. This action proposes to list as hazardous six wastes generated during the production of carbamates:

K156—Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes.

K157—Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes.

K158—Bag house dust, and filter/separation solids from the production of carbamates and carbamoyl oximes.

K159—Organics from the treatment of thiocarbamate wastes.

K160—Solids (including filter wastes, separation solids, and spent catalysts) from the production of thiocarbamates and solids from the treatment of thiocarbamate wastes.

K161—Purification solids (including filtration, evaporation, and centrifugation solids), baghouse dust, and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)

Under the authority of section 3001 of the Resource Conservation and Recovery Act of 1976, as amended (RCRA), and EPA's regulations at 40 CFR 261.11, EPA has promulgated in 40 CFR 261.33 a list of commercial chemical products or manufacturing chemical intermediates that are hazardous wastes if they are discarded or intended to be discarded. The phrase "commercial chemical product or manufacturing chemical intermediate" refers to a chemical substance which is manufactured or formulated for commercial or manufacturing use, and which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. Section 261.33 also lists as hazardous wastes off-specification variants and the residues and debris from the clean-up of spills of these chemicals if discarded (§ 261.33 (b) and (d)). Finally § 261.33 lists as hazardous wastes the containers that have held those chemicals listed in § 261.33(e), if they are discarded, unless the containers have been triple-rinsed with a solvent capable of removing the chemical, or have been decontaminated in an equivalent manner.

In listing waste as hazardous at § 261.33, the Agency intends to encompass those hazardous chemical products which, for various reasons, are sometimes disposed in pure or diluted form. The regulation is intended to designate chemicals themselves as hazardous waste, if discarded.

A chemical substance is listed in 40 CFR 261.33(e), if it meets the criteria of § 261.11(a)(2); that is, it is acutely hazardous because it has been found to be fatal to humans in low doses or in the absence of data on human toxicity, it has been shown in animal studies to have an oral (rat) LD50 of less than 50 milligrams per kilogram, a dermal (rabbit) LD50 of less than 200 milligrams per kilogram, an inhalation (rat) LC50 of less than 2 mg/L, or is otherwise capable of causing or significantly contributing to serious illness.

Chemical substances which pose toxic threats to human health or the environment are listed in 40 CFR 261.33(f). For the purposes of identifying wastes to be included on this list of toxic discarded commercial products, off-specification species, container residues , and spill residues thereof, the Agency considers principally the nature of the toxicity (see 40 CFR 261.11(a)(3)(i)) and its concentration (see 40 CFR 261.11(a)(3)(ii)).

This action proposes that the 22 substances listed in Table 5 be added to the list of acutely hazardous wastes. The commercial chemical products bendiocarb and ziram were previously proposed to be listed as toxic hazardous wastes (49 FR 49784). Today the Agency is proposing to list these two chemicals as acutely hazardous, based on more current toxicity information. This action also proposes that four generic groups and 48 specific substances listed in Table 6 should be added to the list of toxic hazardous wastes because all of these compounds meet the criteria for listing hazardous wastes contained in 40 CFR 261.11(a)(3).

The Agency requests comments on the proposed listing of the above wastes, particularly those identified as K156–

K161 wastes, and on the option of not listing these wastes. EPA requests comments on the data used in this proposed listing determination, the methodology and assumptions used in the risk assessment, and other analyses supporting the proposed listings.

TABLE 5.—LIST OF PROPOSED ACUTE HAZARDOUS WASTES

Hazardous waste No.	Acutely hazardous wastes—CAS name (common name in parentheses)	CAS No.
P185	1,3-Dithiolane-2-carboxaldehyde, 2,4- dimethyl-, O- [(methylamino)carbonyl]oxime (Tirpate)	26419–73–8
P187	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb)	22781–23–3
P127	7-Benzofuranol, 2,3-dihydro-2,2- dimethyl-,methylcarbamate (Carbofuran)	1563–66–2
P188	Benzoic acid, 2-hydroxy, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro- 1,3a,8-trimethylpyrrolo[2,3-b]indol-5- yl methylcarbamate ester (1:1) (Physostigmine salicylate).	57–64–7
P189	Carbamic acid, [(dibutylamino)thio]methyl-, 2,3- dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan) .	55285–14–8
P190	Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb)	1129–41–5
P191	Carbamic acid, dimethyl-, 1- [(dimethylamino)carbonyl]-5-methyl-1H- pyrazol-3-yl ester (Dimetilan)	644–64–4
P192	Carbamic acid, dimethyl-, 3-methyl-1- (1-methylethyl)-1H-pyrazol-5-yl ester (Isolan)	119–38–0
P193	Carbamic acid, [1,2- phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl)	23564–05–8
P194	Ethanimidothioc acid, 2- (dimethylamino)-N- [[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl) .	23135–22–0
P195	Ethanimidothioic acid, N,N'- [thiobis[(methylimino)carbonyloxy]]bis- , dimethyl ester (Thiodicarb)	59669–26–0
P196	Manganese, bis(dimethylcarbamodithioato-S,S')-, (Manganese dimethyldithiocarbamate)	15339–36–3
P197	Methanimidamide, N,N-dimethyl-N'-[2- methyl-4- [[(methylamino)carbonyl]oxy]phenyl]- (Formparanate)	17702–57–7
P198	Methanimidamide, N,N-dimethyl-N'-[3- [[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride).	23422–53–9
P128	Phenol, 4-(dimethylamino)-3,5-dimethyl- , methylcarbamate (ester) (Mexacarbate)	315–18–4
P199	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate (Methiocarb)	2032–65–7
P200	Phenol, 2-(1-methylethoxy)-, methylcarbamate (Propoxur)	114–26–1
P201	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb)	2631–37–0
P202	Phenol, 3-(1-methylethyl), methyl carbamate (Hercules AC–5727)	64–00–6
P203	Propanal, 2-methyl-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime (Aldicarb sulfone)	1646–88–4
P204	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8- trimethyl-, methylcarbamate (ester), (3aS-cis)-(Physostigmine).	57–47–6
P205	Zinc, bis(dimethylcarbamodithioato- S,S')-, (Ziram)	137–30–4

TABLE 6.—LIST OF PROPOSED TOXIC HAZARDOUS WASTES

Hazardous waste No.	Toxic hazardous wastes—IUPAC Name (Common name in parentheses)	CAS No.
U360	Carbamates, N.O.S.	
U361	Carbamoyl Oximes, N.O.S.	
U362	Thiocarbamates, N.O.S.	
U363	Dithiocarbamate acids, salts and/or esters, N.O.S. (This listing includes mixtures of one or more dithiocarbamic acid, salt, and/or ester).	
U279	1-Naphthalenol, methylcarbamate (Carbaryl)	63–25–2
U364	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol)	22961–82–6
U365	1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ester (Molinate)	2212–67–1
U366	2H-1,3,5-Thiadiazine-2-thione, tetrahydro-3,5-dimethyl-(Dazomet)	533–74–4
U367	7-Benzofuranol, 2,3-dihydro-2,2- dimethyl- (Carbofuran phenol)	1563–38–8
U368	Antimony, tris (dipentylcarbamodithioato-S,S')-(Antimony trisdipentyldithiocarbamate)	15890–25–2
U369	Antimony, tris[bis(2- ethylhexyl)carbamodithioato-S,S']-, (Antimony tris(2- ethylhexyl)dithiocarbamate)	15991–76–1
U370	Bismuth, tris(dimethylcarbamodithioato-S,S')-, (Methyl bismate)	21260–46–8
U371	Carbamic acid, [(dimethylamino)iminomethyl)] methyl, ethyl ester monohydrochloride (Hexazinone intermediate).	65086–85–3
U280	Carbamic acid, (3-chlorophenyl)-, 4- chloro-2-butynyl ester (Barban)	101–27–9
U372	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim)	10605–21–7
U373	Carbamic acid, phenyl-, 1-methylethyl ester (Propham)	122–42–9
U374	Carbamic acid, [[3- [(dimethylamino)carbonyl]-2- pyridinyl]sulfonyl]-phenyl ester (U9069)	112006–94–7
U271	Carbamic acid, [1- [(butylamino)carbonyl]-1H- benzimidazol-2-yl]-, methyl ester (Benomyl)	17804–35–2
U375	Carbamic acid, butyl-, 3-iodo-2-propynyl ester (Troysan Polyphase)	55406–53–6
U376	Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid (Selenium dimethyldithiocarbamate).	144–34–3
U377	Carbamodithioic acid, methyl,- monopotassium salt (Potassium n-methyldithiocarbamate)	137–41–7
U378	Carbamodithioic acid, (hydroxymethyl)methyl-, monopotassium salt (Busan 40)	51026–28–9
U277	Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester (Sulfallate)	95–06–7
U379	Carbamodithioic acid, dibutyl, sodium salt (Sodium dibutyldithiocarbamate)	136–30–1
U380	Carbamodithioic acid, dibutyl-, methylene ester (Vanlube 7723)	10254–57–6
U381	Carbamodithioic acid, diethyl-, sodium salt (Sodium diethyldithiocarbamate)	148–18–5
U382	Carbamodithioic acid, dimethyl-, sodium salt (Dibam)	128–04–1
U383	Carbamodithioic acid, dimethyl, potassium salt (Potassium dimethyl dithiocarbamate) (Busan 85)	128–03–0
U384	Carbamodithioic acid, methyl-, monosodium salt (Metam Sodium)	137–42–8
U385	Carbamothioic acid, dipropyl-, S-propyl ester (Vernolate)	1929–77–7
U386	Carbamothioic acid, cyclohexylethyl-, S-ethyl ester (Cycloate)	1134–23–2
U387	Carbamothioic acid, dipropyl-, S- (phenylmethyl) ester (Prosulfocarb)	52888–80–9

TABLE 6.—LIST OF PROPOSED TOXIC HAZARDOUS WASTES—Continued

Hazardous waste No.	Toxic hazardous wastes—IUPAC Name (Common name in parentheses)	CAS No.
U388	Carbamothioic acid, (1,2-dimethylpropyl) ethyl-, S- (phenylmethyl) ester (Esprocarb)	85785-20-2
U389	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2- propenyl) ester (Triallate)	2303-17-5
U390	Carbamothioic acid, dipropyl-, S-ethyl ester (Eptam)	759-94-4
U391	Carbamothioic acid, butylethyl-, S-propyl ester (Pebulate)	1114-71-2
U392	Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester (Butylate)	2008-41-5
U393	Copper, bis(dimethylcarbamodithioato- S,S')-, (Copper dimethyldithiocarbamate)	137-29-1
U394	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester (A2213)	30558-43-1
U395	Ethanol, 2,2'-oxybis-, dicarbamate (Reactacrease 4-DEG)	5952-26-1
U396	Iron, tris(dimethyl carbamodithioato- S,S')-, (Ferbam)	14484-64-1
U397	Lead, bis(dipentyl carbamodithioato S,S')-	36501-84-5
U398	Molybdenum, bis(dibutyl carbamothioato)di-.mu.-oxodioxodi-, sulfurized	68412-26-0
U399	Nickel, bis(dibutyl carbamodithioato- S,S')-(Nickel dibutyldithiocarbamate)	13927-77-0
U400	Piperidine, 1,1'- (tetrathiodicarbonothioyl)-bis-(Sulfads)	120-54-7
U401	Bis(dimethyl thiocarbamoyl) sulfide (Tetramethylthiuram monosulfide)	97-74-5
U402	Thioperoxydicarbonic diamide, tetrabutyl (Butyl Tuads)	1634-02-2
U403	Thioperoxydicarbonic diamide, tetraethyl (Disulfiram)	97-77-8
U404	Ethanamine, N,N-diethyl- (Triethylamine)	121-44-8
U405	Zinc, bis[bis(phenylmethyl)carbamodithioato- S,S']- (Arazate)	14726-36-4
U406	Zinc bis(dibutylcarbamodithioato- S,S')-(Butyl Ziram)	136-23-2
U407	Zinc, bis(diethylcarbamodithioato- S,S')-(Ethyl Ziram)	14324-55-1

As a result of the Agency's studies, a number of generic groups of wastes produced from the manufacture of carbamates, carbamoyl oximes, thiocarbamates, and dithiocarbamates were not found by the Agency to require additional regulation as a listed hazardous waste under RCRA. The Agency is therefore proposing to not list as hazardous the following categories of wastes:

- —Spent carbon and wastewater treatment sludges from the production of carbamates and carbamoyl oximes
- —Wastewaters from the production of thiocarbamates and treatment of wastes from thiocarbamate production
- —Process Wastewater (including supernates, filtrates, and washwaters) from the production of dithiocarbamates
- —Reactor vent scrubber water from the production of dithiocarbamates
- —Organic wastes (including spent solvents, solvent rinses, process decantates, and still bottoms) from the production of dithiocarbamates

Pursuant to HSWA, the Agency has collected information that supports the addition of these six wastes to 40 CFR 261.32. The Agency proposes to add K156, K157, K158, K159, K160, and K161 to 40 CFR 261.32 because the wastes satisfy the criteria in 40 CFR 261.11(a)(1–3) for listing hazardous wastes. Based on the similarity of wastes from the production of each functional chemical class (carbamates/carbamoyl oximes, thiocarbamates, and dithiocarbamates), the Agency is proposing to identify wastes from each functional chemical class grouped by class and physical properties. Each of the six waste groups proposed for listing as hazardous wastes meets the definition of hazardous wastes by typically and frequently exhibiting toxicity, persistence, and mobility.

Carbamate wastes that satisfy the proposed hazardous waste listing descriptions are not limited to the five typical production processes described above in section II.D. Wastes from any process that produces any of the four major functional carbamate classes (i.e., carbamates, carbamoyl oximes, thiocarbamates, and dithiocarbamates) would be subject to hazardous waste regulation.

The proposed hazardous waste listings are intended to encompass the wastes generated from any carbamate manufacturing, including the wastes generated when carbamates are produced as intermediates. For example, a facility may produce a carbamate intermediate to be used directly as a raw material in another process. Similar wastes are generated from the production of the carbamate whether it is the final product or an intermediate product.

Upon promulgation of these proposed listings, all wastes meeting the listing descriptions would become hazardous wastes and would require treatment, storage, or disposal at permitted facilities. Residuals from the treatment, storage, or disposal of the wastes included in this proposed listing also would be classified as hazardous wastes by the "derived-from" rule (40 CFR 261.3(c)(2)(i)). For example, ash or other residuals from treatment of the listed wastes would be subject to the hazardous waste regulations. Also, 40 CFR 261.3(a)(2)(iv) (the "mixture" rule) provides that any mixture of a listed waste and a solid waste is itself a RCRA hazardous waste with certain limited exceptions.

However, when these wastes are recycled as described in 40 CFR 261.2(e)(1)(iii) or 261.4(a)(8), they are not solid wastes and are not subject to hazardous waste regulations. For example, if a waste is collected and returned in a closed-loop fashion to the same carbamate process, the waste would not be regulated. To meet the exemption, the waste must meet the three key requirements outlined in the rules and in 50 FR 639 (January 4, 1985): (1) The material must be returned to the original process from which it was generated without first being reclaimed; (2) the production process to which the materials are returned must use raw materials as principal feedstocks; and (3) the material must be returned as a substitute for raw material feedstock in the original production process. (The regulations contain other recycling exclusions as well, but the provisions referenced above are the principal ones most likely to be applicable to the wastes at issue in this proposal.)

B. Description of the Wastes

While the Agency has observed that carbamate manufacturing processes differ according to product and raw materials, many similarities in the wastes generated exist. The proposal to list K156 through K161 and to not list other groupings of wastes from this industry is based on the similarity of the production processes used by carbamate manufacturers and the similarity of the wastes generated by these facilities. In the course of the Agency's evaluations, wastes within similar processes were

grouped by like physical properties due to their similar management, and to facilitate the development of potential land disposal treatment standards (see 40 CFR 268.2(f)). Wastewaters with less than 1 percent by weight of total organic carbon (TOC) and less than 1 percent by weight of total suspended solids (TSS) were grouped as aqueous. Liquids that contained equal to or greater than 1 percent by weight of TOC were grouped as organic, and wastes that contain equal to or greater than 1 percent by weight of TSS were grouped as solids. When process and wastes characterizations are taken into account, ten waste groups result.

Group 1 consists of organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes. The Agency is proposing that these wastes be listed as Hazardous Waste Number K156.

Group 2 wastes include wastewaters (including scrubber waters, condenser waters, washwaters, separation waters) from the production of carbamates and carbamoyl oximes. Group 2 wastewaters are proposed to be listed as Hazardous Waste Number K157.

Group 3 consists of solids from the production of carbamate and carbamoyl oxime products. These wastes are typically generated from the filtration of liquid products and include such wastes as baghouse dusts, dust collector bags, and process precipitates, and may contain high levels of carbamate product. From this generic waste grouping, wastewater treatment sludges and spent carbon from the production of carbamates and carbamoyl oximes are not proposed for listing. The decision not to list these wastes and other waste groupings is discussed in detail in section III.C.8. Group 3 baghouse dusts and filter/separation solids are proposed to be listed as Hazardous Waste Number K158.

Group 4 wastes include organics from the treatment of thiocarbamate wastes. These wastes are generated from the treatment of the brine wastewater from the carbamolation reaction, and are proposed to be listed as Hazardous Waste Number K159.

Group 5 wastes are wastewaters from the production of thiocarbamates and treatment of wastes from thiocarbamate production. EPA is proposing not to list this group of wastes.

Group 6 wastes are the solids (including filter wastes, separation solids, and spent catalysts) from the production of thiocarbamates and solids from the treatment of thiocarbamate wastes. These wastes include spent catalysts generated from the production of chlorothioformates, filter cakes from the filtration of product to remove byproduct amine chlorides, and solid wastes resulting from the treatment of waste brine from the carbamolation step. The Agency is proposing to list Group 6 wastes as Hazardous Waste Number K160.

Group 7 wastes include process wastewater (including supernates, filtrates, and washwaters) and Group 8 includes reactor vent scrubber water from the production of dithiocarbamates. EPA is proposing not to list group 7 or group 8 wastes.

Group 9 wastes include purification solids, baghouse dust, and floor sweepings from the production of dithiocarbamates. In many cases these wastes are the residues resulting from the filtration of a liquid product, and includes filtration media, filters, filter cloths, centrifugation solids, evaporation solids, or dryer wastes. Group 9 wastes are proposed for listing as Hazardous Waste Number K161.

Group 10 wastes include organic wastes (including spent solvents, solvent rinses, process decantates, and still bottoms) from the production of dithiocarbamates. EPA is proposing not to list this group of wastes.

Based on data collected from industry by the 1990 RCRA section 3007 survey, engineering site visits, and sampling and analysis, the Agency believes that each of the waste groups typically contain significant concentrations of hazardous constituents. Table 7 identifies the constituents of concern for the carbamate waste streams. The Agency conducted sampling and analysis of each of these wastes to support this proposed hazardous waste listing determination. The following section, III.C., presents this data and additional health effects data, which are the basis for the Agency's proposal to list or not list the wastes studied in this rulemaking.

The total reported generation rate of these wastes in 1990 was approximately 841,000 metric tons. Tables 8 and 9 present the characteristics of, and management method used for these wastes by group.

TABLE 7.—WASTE STREAM CONSTITUENTS

Waste group	Constituent
1—Organic Carbamate/Carbamoyl Oxime Wastes.	Acetone, acetonitrile, acetophenone, aniline, benomyl, benzene, carbaryl, carbendazim, carbofuran, carbosulfan, chlorobenzene, chloroform, odichlorobenzene, hexane, methanol, methomyl, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, phenol, pyridine, toluene, triethylamine, xylene.
2—Aqueous Carbamate/Carbamoyl Oxime Wastes.	Acetone, carbon tetrachloride, chloroform, formaldehyde, methomyl, methyl isobutyl ketone, methyl chloride, methyl ethyl ketone, methylene chloride, ophenylenediamine, pyridine, triethylamine.
3—Solid Carbamate/Carbamoyl Oxime Wastes.	Benomyl, carbendazim, carbofuran, carbosulfan, chloroform, hexane, methanol, methylene chloride, phenol, xylene.
4—Organic Thiocarbamate Wastes.	Benzene, butylate, eptam, molinate, pebulate, vernolate.
5—Aqueous Thiocarbamate Wastes.	Benzene, butylate, eptam, molinate, pebulate, toluene, vernolate, xylene.
6—Solid Thiocarbamate Wastes.	Butylate, eptam, cycloate, molinate, pebulate, vernolate.
7—Aqueous Dithiocarbamate Process Waters.	Carbon disulfide, dithiocarbamate product, xylene.
8—Aqueous Dithiocarbamate Scrubber Wastes.	Carbon disulfide, dithiocarbamate product, methylene chloride, n-nitrosodimethylamine.
9—Solid Dithiocarbamate Wastes.	Carbon disulfide, dithiocarbamate product, xylene.
10—Organic Dithiocarbamate Wastes.	Carbon disulfide, dithiocarbamate product, hexane, toluene, xylene.

TABLE 8.—1990 WASTE MANAGEMENT BY RCRA HAZARDOUS WASTE IDENTIFICATION AND GROUP

[metric tons/year] [1]

Waste classification	Non-haz.	As-haz.	Corr.	Ignit.	TC	I&TC	I&C	TC&C	Unknown
Group 1	46,398	1,912	69,780	1,980	1.5	2,302	2,773	.....	1,368
Group 2	140,145	3,735	246,595	6.8	41.9	.....	.....	.....	Varies.
Group 3	9,729	0.4	14.8	5.5	12.3	.....	.....	.....	.....
Group 4	.....	.....	.....	.....	.....	549	.....	.....	.....
Group 5	.....	.....	130,664	.....	.....	.....	.....	.....	.....
Group 6	.....	77	.....	.....	588	.....	.....	.....	.....
Group 7	43,810	7,218	9	1.1	380,430	.....	.....	.....	230
Group 8	46,054	.....	49.1	.....	[2]0	.....	.....	1,055	89
Group 9	3,493	195	.....	3.1	15.8	.....	.....	.....	205
Group 10	.....	46.8	.....	162.9	.....	65.4	.....	.....	91
Total	289,629	13,185	447,112	2,159	381,090	2,916	2,773	1,055	1,983

Non-Haz.: Managed as nonhazardous waste
As-Haz.: Managed as a hazardous waste
Characteristically Hazardous Wastes
Ignit.: Ignitable (40 CFR 261.21)
Corr.: Corrosive (40 CFR 261.22)
I&C: Ignitable and corrosive
I&TC: Ignitable and TC
TC&C: TC and corrosive
TC: Toxicity Characteristic (40 CFR 261.24)
[1] Wastes may have several classifications; therefore, the total mass of each waste group may exceed the actual mass.
[2] There is a toxic stream in Group 8 but it was not generated in 1990.

TABLE 9.—CURRENT WASTE MANAGEMENT BY WASTE TYPE AND QUANTITY

[metric tons/year]

Group	1	2	3	4	5	6	7	8	9	10	Total
Recycle/Reuse	1,601	.....	26	.....	.....	.....	701	57	64	180	2,629
Incineration	3,263	1,975	18	549	.....	.....	.....	50	2	98	5,955
Fuel Blending	.....	.....	.....	.....	.....	.....	.....	.....	.....	24	24
Boiler	6,360	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,360
POTW	.....	20,497	.....	.....	.....	.....	42,599	45,957	.....	.....	109,053
PrOTW	2,922	4,986	.....	.....	.....	.....	1,410	23	.....	.....	9,341
WWTP	112,292	238,751	.....	.....	130,664	.....	4,670	.....	.....	.....	486,377
Subtitle C Landfill	.....	.....	.....	.....	.....	665	.....	.....	193	.....	858
Subtitle D Landfill	.....	.....	1340	.....	.....	.....	.....	.....	3,199	.....	4,539
Deep Well Injection	.....	.....	.....	.....	213,582	.....	1,517	100	.....	.....	215,199
Other	.....	.....	6	.....	.....	.....	645	13	.....	65	729
Total	126,438	266,209	1,390	549	344,246	665	51,542	46,200	3,458	367	841,064

POTW—Publicly Owned Treatment Works
PrOTW—Privately Owned Treatment Works
WWTP—Wastewater Treatment Plant

C. Basis for Listing Determination

1. Waste Characterization and Constituents of Concern

The Agency has conducted significant data gathering efforts in order to evaluate each of the criteria for listing hazardous wastes found at 40 CFR 261.11. In conducting its investigation before proposing to list a specific waste under 40 CFR 261.32, the Agency characterized the waste based on survey information, engineering analysis, and sampling and analysis. The constituents of concern in this proposal were identified by these methods and are proposed as the basis for listing and for addition to appendix VII of 40 CFR part 261 (see Table 7). The toxic constituents of concern which are the basis of this and possibly future hazardous waste listing determinations are being proposed for addition to appendix VIII of 40 CFR part 261 pursuant to 40 CFR 261.11(a)(3).

This section summarizes the information concerning waste characterization and constituents of concern that EPA has gathered to support this proposed listing. Other compounds also have been identified in these wastes but are not presented as constituents of concern because they are either not sufficiently toxic, are present at low concentrations, or do not migrate through the environment under reasonable conditions.

Information regarding the identity and concentration of the compounds found in carbamate wastes from EPA sampling during engineering site visits is presented in summary form in the Appendix A of the "non-CBI" Engineering Analysis of the Production of Carbamates, which is available in the Public Docket for this proposed rulemaking. See "**ADDRESSEES**" section.

The constituents of concern are found at varying levels in each of the carbamate waste streams proposed for listing. Despite differences in constituents and concentrations, each of the wastes proposed for listing exhibit similar levels of potential hazard and are also amenable to similar treatment technology. The Agency therefore is proposing to regulate wastes from each of these processes together under the K156 through K161 listings.

Table 10 lists the constituents found at concentrations above the level of concern (the Agency's rationale for identifying a concentration level of

concern is detailed in the following section) from wastes sampled and analyzed by the Agency during the course of the engineering analysis of wastes in the carbamate industry and effluent guideline development under sections 405 (d) and (e) of the Clean Water Act (CWA), or reported present by the manufacturer in response to the Agency's RCRA section 3007 questionnaire. This table presents a compilation of all concentration data for each group of waste studied. Additional constituents were detected at concentrations below the level of concern. All of the collected data is presented in the carbamates engineering analysis. However, the risk analysis described in section III.C.5. of this preamble used only the results of the carbamate industry study.

TABLE 10.—RANGE OF CONCENTRATIONS FOR CONSTITUENTS OF CONCERN

Group	Constituent of concern	No. of streams	Max. conc. (ppm)	Min. conc. (ppm)	Mean conc. (ppm)	Median conc. (ppm)
1	acetone	8	900,000	13	214,502	96,000
	acetonitrile	3	400,000	50,000	176,667	80,000
	acetophenone	1	890.7	890.7	890.7	890.7
	aniline	1	3.8	3.8	3.8	3.8
	benomyl	2	20,000	22	10,011	10,011
	benzene	1	350	350	350	350
	carbaryl	1	100,000	100,000	100,000	100,000
	carbendazim	2	80,000	22.3	40,011	40,011
	carbofuran	3	10,000	2,490	7,497	10,000
	carbosulfan	3	350,000	9	117,433	2,290
	chlorobenzene	1	1,800	1,800	1,800	1,800
	chloroform	1	1.2	1.2	1.2	1.2
	o-dichlorobenzene	1	12,000	12,000	12,000	12,000
	hexane	8	200,000	42	73,755	65,000
	methanol	10	910,000	9.23	359,033	130,100
	methomyl	2	38.7	1.06	19.9	19.9
	methyl ethyl ketone	4	500,000	58	151,240	7,300
	methyl isobutyl ketone	6	650,000	21,000	335,167	210,000
	methylene chloride	7	150,000	1.6	32,572	20,000
	naphthalene	1	6,440	6,440	6,440	6,440
	phenol	5	128,700	0.0138	28,706	3,000
	pyridine	6	130,000	920	63,570	49,750
	toluene	3	980,000	290	334,163	22,200
	triethylamine	2	286,000	580	143,290	143,290
	xylene	6	996,100	7,300	449,200	570,000
2	acetone	12	4,000	0.3	338.3	2.9
	carbon tetrachloride	1	0.51	0.51	0.51	0.51
	chloroform	5	8.6	0.024	2.3	0.57
	formaldehyde	1	48	48	48	48
	methomyl	5	40,000	0.0016	10,750	49.5
	methyl isobutyl ketone	5	300	0.8	78.3	12
	methyl chloride	5	4,200	0.0076	840.9	3.5
	methyl ethyl ketone	5	10,000	1.1	3,400.7	300
	methylene chloride	15	4,100	0.074	285.9	1.4
	o-phenylenediamine	1	77.4	77.4	77.4	77.4
	pyridine	3	13,600	17.6	4,687	443
	triethylamine	5	7,380	7.4	1,901	9.8
3	benomyl	2	20,000	0.3	10,000	10,000
	carbendazim	2	20,000	0.3	10,000	10,000
	carbofuran	2	700,000	6.8	350,003	350,003
	carbosulfan	1	100,000	100,000	100,000	100,000
	chloroform	1	2,600	2,600	2,600	2,600
	hexane	1	3,800	3,800	3,800	3,800
	methanol	2	69.5	58	63.8	63.8
	methylene chloride	3	13,000	0.047	6,000	5,000
	phenol	2	5,000	0.346	2,500	2,500
	xylene	2	135,100	610	67,855	67,855
4	butylate	1	50,000	50,000	50,000	50,000
	eptam	1	50,000	50,000	50,000	50,000
	molinate	1	50,000	50,000	50,000	50,000
	pebulate	1	50,000	50,000	50,000	50,000
	vernolate	1	50,000	50,000	50,000	50,000
5	benzene	1	0.15	0.15	0.15	0.15
	butylate	2	1.2	0.3	0.8	0.8
	eptam	3	170	0.14	57	1.7
	molinate	2	39	7.5	23.3	23.3
	pebulate	3	0.71	0.015	0.27	0.09
	vernolate	2	0.16	0.021	0.09	0.09
6	benzene	1	1,100	1,100	1,100	1,100
	toluene	1	9,400	9,400	9,400	9,400
	butylate	2	8,800	7,400	8,100	8,100
	eptam	3	401,000	12,000	271,333	271,333
	molinate	1	22,000	22,000	22,000	22,000

TABLE 10.—RANGE OF CONCENTRATIONS FOR CONSTITUENTS OF CONCERN—Continued

Group	Constituent of concern	No. of streams	Max. conc. (ppm)	Min. conc. (ppm)	Mean conc. (ppm)	Median conc. (ppm)
	pebulate	1	500	500	500	500
	vernolate	1	620	620	620	620
	xylene	1	201	201	201	201
7	carbon disulfide	1	94,000	94,000	94,000	94,000
	xylene	4	5,000	1,000	3,750	4,500
	dithiocarbamate product	8	10,000	10,000	10,000	10,000
8	carbon disulfide	5	5,000	0.028	1,178	15
	methylene chloride	2	0.57	0.490	0.53	0.53
	n-nitrosodimethylamine	1	104	104	104	104
	piperidine	1	65,000	65,000	65,000	65,000
	dithiocarbamate product	5	6,960	42.4	2,039	70.9
9	carbon disulfide	2	420	15	218	218
	dithiocarbamate product	81	1,000,000	1,000	505,201	450,000
	xylene	2	240,000	240,000	240,000	240,000
10	carbon disulfide	5	1,000,000	4,000	676,800	950,000
	hexane	7	1,000,000	600,000	942,857	1,000,000
	toluene	2	50,000	50,000	50,000	50,000
	xylene	2	600,000	600,000	600,000	600,000

2. Human Health Criteria and Effects

The Agency uses health-based levels, or HBLs, to evaluate levels of concern of toxic constituents in various media. In establishing HBLs, EPA evaluates a wide variety of health effects data and existing standards and criteria. EPA uses any Maximum Contaminant Level (MCL) promulgated under the Safe Drinking Water Act as an HBL for contaminants in aqueous streams. MCLs are Drinking Water Standards promulgated under section 1412 of the Safe Drinking Water Act of 1974 (SDWA), as amended in 1984 for both carcinogenic and noncarcinogenic compounds. In setting MCLs, EPA considers a range of pertinent factors (see 52 FR 25697–98, July 8, 1987). For other media, or if there is no MCL, EPA uses an oral reference dose (RfD), an inhalation reference concentration (RfC), and/or a carcinogenic slope factor (CSF) to derive the HBL, in conjunction with various exposure assumptions and, for carcinogens, a risk level of concern. The Agency relies on standard intake and exposure assumptions to derive HBLs. Standard daily intake assumptions are: 2 liters of water; 20 cubic meters of air; 200 mg of soil for six years (children) and 100 mg of soil for 24 years (adults). For carcinogens, the daily intake is averaged over a 70 year lifetime; for noncarcinogens, the daily intake is averaged over a daily period of exposure. The risk level of concern may vary, but for the purpose of deriving HBLs in the following discussion, the minimal or threshold risk level of concern is taken as 10^{-6} (i.e., one incremental cancer risk in a million based on lifetime exposure). A given constituent may have an RfD, and RfC, and/or a CSF, depending on the variety and nature of the toxic effects exhibited. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population, including sensitive subgroups, that is likely not to present appreciable risk of deleterious effects during a lifetime. The CSF is an estimate of the upper bound confidence limit of the lifetime risk of developing cancer, per unit dose, which results from the application of a low-dose extrapolation procedure. When available, EPA uses RfDs, RfCs, and CSFs that have been verified by the Agency's Reference Dose/Reference Concentration (RfD/RfC) Work Group or Carcinogen Risk Assessment Verification Endeavor (CRAVE). If no verified value exists, other estimates of RfDs, RfCs, and CSFs are examined to determine if they are appropriate for use in establishing HBLs. Health-based levels in water and soil, and the criteria used to establish them, are shown in Table 11 for the constituents identified in the carbamate wastes. A more detailed discussion of the toxicity of these constituents is included in the background document "Carbamate Waste Listing Support: Health Effects Background Document" and associated materials for this proposal and is available from the Public Docket at EPA Headquarters. See **ADDRESSES** section.

TABLE. 11.—ORAL AND INHALATION TOXICITY INFORMATION FOR WASTE CONSTITUENTS

Constituents	RfD (mg/kg/day)	Oral CSF (mg/kg/day)$^{-1}$	RfC (mg/m^3)	Inhalation CSF (mg/kg/day)$^{-1}$	HBL water (mg/L)	HBL soil (mg/kg)	MCL (mg/L)	Toxicity
Acetone (67–64–1).	1E–1 (1)	N[a] (1,7)	N (1,7)	N (1,7)	4E+0	8E+3	N (1,6)	Systemic: Increased liver and kidney weights, and nephrotoxicity.
Acetophenone (98–86–2).	1E–1 (1)	N (1,7)	N (1,7)	N (1,7)	4E+0	8E+3	N (1,6)	Systemic: General toxicity.
Aniline (62–53–3).	N (1,7)	5.7E–3 (1)	1E–3 (1)	N (1,7)	6.25E–3	1.0E+2	N (1,6)	Cancer: Spleen tumors. Systemic: Spleen toxicity.
Anthracene (120–12–7).	3E-1 (1)	N (1,7)	N (1,7)	N (1,7)	1E+1	3E+4	N (1,6)	Systemic: Phototoxic dermatitis, inflammation of the gastrointestinal tract.
Antimony (7440–36–0).	4E–4 (1,6,7)	N (1,7)	N (1,7)	N (1,7)	6E–3	3E+1	0.006 (6)	Systemic: Increased mortality and altered blood glucose and cholesterol levels.

TABLE. 11.—ORAL AND INHALATION TOXICITY INFORMATION FOR WASTE CONSTITUENTS—Continued

Constituents	RfD (mg/kg/day)	Oral CSF (mg/kg/day)$^{-1}$	RfC (mg/m^3)	Inhalation CSF (mg/kg/day)$^{-1}$	HBL water (mg/L)	HBL soil (mg/kg)	MCL (mg/L)	Toxicity
Arsenic (7440–38–2).	3E–4 (1)	1.75E+0 (1)	N (1,7)	1.5E+1 (1)	5E–2	4E–1	0.05 (6)	Cancer: Respiratory system tumors. Systemic: Hyperpigmentation, keratosis, and possible vascular complications.
Barium (7440–39–3).	7E–2 (1)	N (1,7)	5E–4 (7)	N (1,7)	2E+0	6E+3	2 (6)	Systemic: Oral; Increased blood pressure. Inhalation: Fetotoxicity.
Benomyl (17804–35–2).	5E–2 (1)	N (1,7)	N (1,7)	N (1,7)	2E+0	4E+3	N (1,6)	Systemic: Fetotoxicity (decreased pup weanling weights).
Bensulide (741–58–2).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Neuro-muscular pathology[b].
Benz[a]-anthracene (56–55–3).	2E–1 (92)[c]	2E+1 (92)	N (1,7)	N (1,7)	1E–4	3E–2	0.0001 PMCL (6)	Cancer: Liver hepatoma. Systemic: Respiratory system effects.
Benzene (71–43–2).	N (1,7)	2.9E–2 (1)	N (1,7)	2.9E–2 (7)	5E–3	2E+1	0.005 (6)	Cancer: Human leukemia.
Benzo[b]-fluoranthene (205–99–2).	N (1,7)	7.3E–1 (TEF[d])[e]	N (1,7)	N (1,7)	2E–4	9E–1[a]	0.0002 PMCL (6)	Cancer: Lung adenomas and epidermoid carcinomas, putative forestomach tumors.
Benzo[k]-fluoranthene (207–08–9).	N (1,7)	7.3E–2 (TEF[d])[e]	N (1,7)	N (1,7)	2E–4	9E+0[a]	0.0002 PMCL (6)	Cancer: Lung adenomas and epidermoid carcinomas, putative forestomach tumors.
Benzoic acid (65–85–0).	4E+0 (1,7)[f]	N (1,7)	N (1,7)	N (1,7)	1E+2	3E+5	N (1,6)	Systemic: Practically safe to humans and animals.
Butylamine (109–73–9).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
Butylate (2008–41–5).	5E–2 (1)	N (1,7)	N (1,7)	N (1,7)	2E+0	4E+3	N (1,6)	Systemic: Increased relative liver weights.
Cadmium (7440–43–9).	5E–4[g], 1E–3[h] (1)	N (1,7)	N (1,7)	6.3E+0 (1)	5E–3	8E+1	0.005 (6)	Cancer: Human lung, tracheal, and bronchial tumors. Systemic: Significant proteinuria.
Carbendazim (10605–21–70).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Reproductive effects.
Carbofuran (1563–66–2).	5E–3 (1)	N (1,7)	N (1,7)	N (1,7)	4E–2	4E+2	0.04 (6)	Systemic: RBC and plasma cholinesterase inhibition, and testicular and uterine effects.
Carbon disulfide (75–15–0).	1E–1 (1)	N (1,7)	1E–2 (7)	N (1,7)	4E+0	8E+3	N (1,6)	Systemic: Oral; Fetal toxicity and teratogenicity. Inhalation: Fetal toxicity.
Carbon tetrachloride (56–23–5).	7E–4 (1)	1.3E–1 (1)	N (1,7)	5.2E–2 (1)	5E–3	5E+0	0.005 (6)	Cancer: Liver tumors. Systemic: Liver lesions.
Carbosulfan (55285–14–8).	1E–2 (1)	N (1,7)	N (1,7)	N (1,7)	4E–1	8E+2	N (1,6)	Systemic: Decreased body weight.
Chlorobenzene (108–90–7).	2E–2 (1)	N (1,7)	2E–2 (7)	N (1,7)	1E–1	2E+3	0.1 (1)	Systemic: Histopathological changes in liver.
Chloroform (67–66–3).	1E–2 (1)	6E–3 (1)	N (1,7)	8.1E–2 (1)	5.8E–3	1E+2	N (1,6)	Cancer: Kidney tumors. Systemic: Fatty cyst formation in liver.
Chromium VI (18540–29–9).	5E–3 (1)	N (1,7)	N (1,7)	4.2E+1 (1)	1E–1	4E+2	0.1 (6)	Cancer: Human lung tumors. Systemic: Kidney and liver damage, and cardiovascular and gastrointestinal effects.
Chrysene (218–01–9).	N (1,7)	7.3E–2 (TEF[d])[e]	N (1,7)	N (1,7)	2E–4	9E–0[a]	0.0002 PMCL (6)	Cancer: Putative forestomach tumors.
Cyanide (57–12–5).	2E–2 (1)	N (1,7)	N (1,7)	N (1,7)	2E–1	2E+3	0.2 (6)	Systemic: Degenerative neurotoxicity, and thyroid effects.
Cycloate (1134–23–2).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: neurotoxicity skeletal muscle myopathy. (2)[i].
Dibutylamine (111–92–2).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
1,2-Dichlorobenzene (95–50–1).	9E–2 (1)	N (1,7)	2E–1 (7)	N (1,7)	6E–1	8E+3	0.6 (6)	Systemic: Oral; Liver pathology. Inhalation: Decreased relative spleen weight.
1,3-Dichlorobenzene (541–73–1).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Hemoglobin changes and liver and kidney damage.
1,4-Dichlorobenzene (106–46–7).	N (1,7)	2.4E–2 (7)	7E–1 (7)	N (1,7)	7.5E–2	3E+1	0.075 (6)	Cancer: Liver tumors. Systemic: Liver damage.
Diethylphthalate (84–66–2).	8E–1 (1)	N (1,7)	N (1,7)	N (1,7)	3E+1	7E+4	N (1,6)	Systemic: Decreased growth rate, food consumption, and altered organ weights.

TABLE. 11.—ORAL AND INHALATION TOXICITY INFORMATION FOR WASTE CONSTITUENTS—Continued

Constituents	RfD (mg/kg/day)	Oral CSF (mg/kg/day)$^{-1}$	RfC (mg/m^3)	Inhalation CSF (mg/kg/day)$^{-1}$	HBL water (mg/L)	HBL soil (mg/kg)	MCL (mg/L)	Toxicity
Dimethylamine (124–40–3).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Liver fatty degeneration and necrosis, and tubular degeneration of the testes. (2) i.
Dimethyldodecylamine (112–18–5).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Respiratory tract effects.
Dipropylamine (142–84–7).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
Eptam (EPTC) (759–94–4).	2.5E–2 (1)	N (1,7)	N (1,7)	N (1,7)	8.8E–1	2E+3	N (1,6)	Systemic: Degenerative cardiomyopathy.
Esprocarb (85785–20–2).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
Ethylbenzene (100–41–4).	1E–1 (1)	N (1,7)	1E+0 (1)	N (1,7)	7E–1	8E+3	0.7 (6)	Systemic: Liver and kidney effects.
2-Ethylhexylamine (104–75–6).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
Fluoranthene (206–44–0).	4E–2 (1)	N (1,7)	N (1,7)	N (1,7)	1E+0	3E+3	N (1,6)	Systemic: Kidney effects, increased liver weights, hematological alterations.
Formaldehyde (50–00–0).	2E–1 (1)	N (1,7)	N (1,7)	4.5E–2 (1)	7E+0	2E+4	N (1,6)	Cancer: Nasal cavity tumors. Systemic: Gastrointestinal histopathology.
Hexachloroethane (67–72–1).	1E–3 (1)	1.4E–2 (1)	N (1,7)	1.4E–2 (1)	3E–3	5E+1	N (1,6)	Cancer: Hepatocellular carcinoma. Systemic: Atrophy and degeneration of kidney tubules.
Hexane (110–54–3).	6E–2 (7)	N (1,7)	2E–1 (1)	N (1,7)	2E+0	5E+3	N (1,6)	Systemic: Oral; nervous system effects, testicular atrophy. Inhalation: Neurotoxicity (electrophysiological alterations), and epithelial lesions in the nasal cavity.
Hexylamine (111–26–2).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
Isopropanol (67–63–0).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
Lead (7439–92–1).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Cancer: Renal tumors. Systemic: Neurotoxic, adverse hematopoietic, and reproductive and developmental effects.
Mercury (7439–97–6).	3E–4 (7)	N (1,7)	3E–4 (7)	N (1,7)	2E–3	3E+1	0.002 (6)	Systemic: Damage to brain, kidneys, and developing fetuses.
Metam-Sodium (137–42–8).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Developmental effects. (A).
Methanol (67–56–1).	5E–1 (1)	N (1,7)	N (1,7)	N (1,7)	2E+1	4E+4	N (1,6)	Systemic: Alterations in liver enzyme levels, and decreased brain weight.
Methomyl (16752–77–5).	2.5E–2 (1)	N (1,7)	N (1,7)	N (1,7)	9E–1	2E+3	N (1,6)	Systemic: Kidney and spleen pathology.
Methylamine (74–89–5).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Data not available.
Methyl chloride (74–87–3).	N (1,7)	1.3E–2 (7)	N (1,7)	6.3E–3 (7)	3E–3	5E+1	N (1,6)	Cancer: Renal tumors in mice from intermittent inhalation exposure. Systemic: Liver and kidney effects, and degeneration and atrophy of the seminiferous tubules.
Methylene chloride (75–09–2).	6E–2 (1)	7.5E–3 (1)	3E+0 (7)	1.6E–3 (1)	5E–3	9E+1	.005 (6) PMCL	Cancer: Liver tumors. Systemic: Adverse liver effects.
Methyl ethyl ketone (78–93–3).	6E–1 (1)	N (1,7)	1E+0 (1,7)	N (1,7)	2E+1	5E+4	N (1,6)	Systemic: Decreased fetal birth weight.
Methyl isobutyl ketone (108–10–1).	5E–2 (7)	N (1,7)	8E–2 (7)	N (1,7)	2E+0	4E+3	N (1,6)	Systemic: Liver and kidney toxicity.
Methyl isothiocyanate (556–61–6).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Data not available.
Molinate (2212–67–1).	2E–3 (1)	N (1,7)	N (1,7)	N (1,7)	7E–2	2E+2	N (1,6)	Systemic: Reproductive toxicity.
Molybdenum (7439–98–7).	5E–3 (1)	N (1,7)	N (1,7)	N (1,7)	2E–1	4E+2	N (1,6)	Systemic: Increased uric acid in the urine, decreased blood copper levels, and painful swelling in the joint in humans.

TABLE. 11.—ORAL AND INHALATION TOXICITY INFORMATION FOR WASTE CONSTITUENTS—Continued

Constituents	RfD (mg/kg/day)	Oral CSF (mg/kg/day)$^{-1}$	RfC (mg/m^3)	Inhalation CSF (mg/kg/day)$^{-1}$	HBL water (mg/L)	HBL soil (mg/kg)	MCL (mg/L)	Toxicity
Nabam (142–59–6).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Cancer: Putative induction of thyroid adenomas and adenocarcinomas, and hepatomas (75).[k,l]
Naphthalene (91–20–3).	4E–2 (7)	N (1,7)	N (1,7)	N (1,7)	1E+0	3E+3	N (1,6)	Systemic: Decreased whole body weight in rats.
Nickel (7440–02–0).	2E–2 (1)	N (1,7)	N (1,7)	8.4E–1 (1)	1E–1	2E+3	0.1 (6)	Cancer: Respiratory system tumors in humans. Systemic: Pulmonary toxicity.
Nitrobenzene (98–95–3).	5E–4 (1)	N (1,7)	2E–3 (7)	N (1,7)	2E–2	4E+1	N (1,6)	Systemic: Adrenal, renal, and hepatic lesions and hematopathology.
N-Nitroso-di-n-butylamine (924–16–3).	N (1,7)	5.4E+0 (1)	N (1,7)	5.6E+0 (1)	6E–6	1E–1	N (1,6)	Cancer: Bladder and gastrointestinal tract tumors.
N-Nitroso-di-n-methylamine (62–75–9).	N (1,7)	5.1E+1 (1)	N (1,7)	4.9E+1 (1)	7E–7	1E–2	N (1,6)	Cancer: Liver tumors.
Oxamyl (23135–22–0).	2.5E–2	N (1,7)	N (1,7)	N (1,7)	9E–1	2E+3	0.2 (6)	Systemic: Cholinesterase inhibition, liver effects, and fetotoxicity.
Pebulate (1114–71–2).	5E–2 (7)	N (1,7)	N (1,7)	N (1,7)	2E+0	4E+3	N (1,6)	No data available.
Phenol (108–95–2).	6E–1 (1,7)	N (1,7)	N (1,7)	N (1,7)	2E+1	5E+4	N (1,6)	Systemic: Developmental effects (stunted growth).
o-Phenylenediamine (95–54–5).	N (1,7)	4.7E–2 (7)	N (1,7)	N (1,7)	7.4E–4	1.4E+1	N (1,6)	Cancer: Liver tumors.
Piperidine (110–89–4).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Developmental and reproductive effects (5).
n-Propylbenzene (103–65–1).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
Prosulfocarb (52888–80–9).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	No data available.
Pyrene (129–00–00).	3E–2 (1)	N (1,7)	N (1,7)	N (1,7)	1E+0	3E+3	N (1,6)	Systemic: Kidney effects (renal tubular pathology, decreased kidney weight).
Pyridine (110–86–1).	1E–3 (1)	N (1,7)	5E–3 (53)	N (1,7)	4E–2	8E+1	N (1,6)	Systemic: Increased liver weight.
Selenium (7782–49–2).	5E–3 (1)	N (1,7)	N (1,7)	N (1,7)	5E–2	4E+2	0.05 (total) (6)	Systemic: Clinical selenosis.
Styrene (100–42–5).	2E–1 (1)	N (1,7)	1E+0 (1)	N (1,7)	1E–1	2E+4	0.1 (6)	Systemic: Oral; Red blood cell and liver effects. Inhalation: Human central nervous system effects.
Tetralin (119–64–2).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Kidney effects and cataracts.
Toluene (108–88–3).	2E–1 (1)	N (1,7)	4E–1 (1)	N (1,7)	1E+0	2E+4	1.0 (6)	Systemic: Oral; Altered kidney and liver weights. Inhalation: Neurological effects and degeneration of nasal epithelium.
Triethylamine (121–44–8).	N (1,7)	N (1,7)	7E–3 (1)	N (1,7)	NA	NA	N (1,6)	Systemic: Nasal passage toxicity (inflammation).
1,2,3-Trimethylbenzene (526–73–8).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Diminished weight gain, central nervous system depression, and lymphopenia and neutrophilia (2)[m].
1,2,4-Trimethylbenzene (95–63–6).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Diminished weight gain, central nervous system depression, and lymphopenia and neutrophilia (2).
1,3,5-Trimethylbenzene (108–67–8).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Diminished weight gain, central nervous system depression, and lymphopenia and neutrophilia (2).
Vernolate (Vernam) (1929–77–7).	1E–3 (1)	N (1,7)	N (1,7)	N (1,7)	4E–2	8E+1	N (1,6)	Systemic: Altered liver weight and hematopoiesis, and cholinesterase inhibition, elevated alkaline phosphatase levels, and spinal cord and nerve degeneration (100).
Vinyl acetate (108–05–4).	1E+0 (7)	N (1,7)	2E–1 (1)	N (1,7)	4E+1	8E+4	N (1,6)	Systemic: Nasal tract toxicity (lesions).

TABLE. 11.—ORAL AND INHALATION TOXICITY INFORMATION FOR WASTE CONSTITUENTS—Continued

Constituents	RfD (mg/kg/day)	Oral CSF (mg/kg/day)$^{-1}$	RfC (mg/m^3)	Inhalation CSF (mg/kg/day)$^{-1}$	HBL water (mg/L)	HBL soil (mg/kg)	MCL (mg/L)	Toxicity
Xylene (1330–20–7).	2E+0 (1)	N (1,7)	N (1,7)	N (1,7)	1E+1	2E+5	10 (6)	Systemic: Central nervous system effects (hyperactivity), decreased body weight, and increased mortality.
o-Xylene (95–47–6).	2E+0 (7)	N (1,7)	N (1,7)	N (1,7)	7E+12	E+5	N (1,6)	Systemic: Central nervous system effects (hyperactivity) and decreased body weight.
Zinc (7440–66–6).	3E–1 (1)	N (1,7)	N (1,7)	N (1,7)	1E+1	3E+4	N (1,6)	Systemic: Decrease in erythrocyte superoxide dismutase (ESOD) in adult females.
Ziram (137–30–4).	N (1,7)	N (1,7)	N (1,7)	N (1,7)	NA	NA	N (1,6)	Systemic: Alteration of liver enzymes and immune responses, spleen enlargement, and developmental effects (77, 2).

N No data found in reference.
NA Inadequate data for calculation of health based level.
a. None available.
b. At an animal oral LOAEL of 89.8 mg/kg/day.
c. Human cancer potency value.
d. Benzo[a]pyrene Toxicity Equivalent Factor.
e. USEPA Provisional Guidance for the Qualitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. 1993.
f. The human per capita intake was used as the critical dose level.
g. Drinking water RfD.
h. Dietary exposure RfD.
i. Inhalation unit risk.
j. At an animal oral LOAEL of 55 mg/kg/day.
k. At animal LOAEL of 97 ppm.
l. Known toxic effect of ethylene bis-dithiocarbamate (EBDC) metabolite of nabam.
m. Exposure to a mixture of (1,2,3-, 1,2,4-, 1,3,5-) trimethylbenzenes.

References
(1) Integrated Risk Information System (IRIS). 1993.
(2) Hazardous Substances Databank (HSDB). 1993.
(5) RTECS (Registry of Toxic Effects of Chemical Substances) July 1992.
(6) Drinking Water Regulations and Health Advisories.
(7) Health Effects Assessment Summary Tables (HEAST). March 1993.
(53) Health and Environmental Effects Profile for Pyridine. June 1986.
(75) Nabam Pesticide Fact Sheet, Office of Pesticide Program, April 1987.
(77) Ziram TOX ONE-LINER. EPA Office of Pesticides, February 20, 1992.
(92) U.S. Environmental Protection Agency, Office of Research and Development, "Evaluation of the Potential Carcinogenicity of Benz(a)anthracene", June 1988.
(100) Vernolate TOX ONE-LINER. EPA Office of Pesticides, September 23, 1991.
(A) Developmental and Reproductive Toxicity Peer Review of Metam-Sodium. EPA Office of Pesticides.

3. Environmental Damage Cases

The nature and severity of the human health and environmental damage that has occurred as a result of improper management is a factor considered in the decision to list wastes as hazardous (see 40 CFR 261.11(a)(3)(ix)). The Agency has limited records of damages resulting directly from the mismanagement of carbamate wastes. Most applicable is Superfund Record of Decision (EPA Region 4): Stauffer/Cold Creek, AL (First Remedial Action), September, 1989 (PB90–186388). In studying this site, which continues to manufacture thiocarbamate products, the Agency found groundwater contaminated by wastes from the manufacture of the products butylate, cycloate, EPTC, molinate, pebulate, and vernolate at levels of concern. Groundwater contamination at this site was attributed to past disposal of waste solids from thiocarbamate manufacture in an on-site unlined landfill.

The Agency has a limited number of reports of adverse environmental effects from carbamate waste streams proposed for listing. However, because pesticide products when formulated for end use may contain from 0.01 to 100 percent active ingredient, EPA believes that reports of adverse environmental impacts such as ground water contamination, fish kills, birds kills, or other non-target impacts are comparable to the possible adverse environmental impacts which could occur should wastes which contain pesticide active ingredients at comparable concentrations be mismanaged in the way pesticide products have been mismanaged. The Agency has collected information on environmental damages caused by improper use of carbamate products, mismanagement of containers previously storing carbamate products, and an accidental spill releasing a large volume of product to surface waters. The EPA believes these incidents are appropriate to consider in proposing listing several waste streams for the following reasons: (1) The wastes the Agency is proposing to list typically contain the carbamate active ingredients found in the products; (2) the concentrations of the active ingredients in the waste streams are typically many times higher than what is found in some formulated products; and, (3) the nature of some of the waste streams is similar to the product (e.g., solid, granular, fines) and would behave similarly if released uncontrolled to the environment.

In the case of carbamate chemicals the Agency has recorded numerous bird kill incidents associated with the use or possible misuse of carbamate products, which the Agency feels are applicable to an open disposal mismanagement scenario of solids. For example, between 1972 and 1991, 107 incidents have been attributed to granular carbofuran and 40 to flowable carbofuran. These incidents resulted in loss of 9,600 and 7,500 birds, respectively.

In general, carbamate products are acutely toxic to aquatic organisms. A number of fish kills have been attributed to carbamate products. From 1980 to 1988, the California Department of Fish and Game's Pesticide Investigations Unit estimated 7,000 to 30,000 fish were killed in the Colusa Basin Drain due to molinate entering the waterway from carbamates in rice fields. The most severe fish kill incident resulted from the July 14, 1991, derailment of a tank car containing 19,500 pounds of metam-sodium, a dithiocarbamate product. As a result of the spill, the surrounding

environment along a 45-mile stretch of the Sacramento River and portions of Lake Shasta were significantly adversely affected. More than 200,000 fish were killed, and several hundred people were treated for eye, skin, and respiratory irritation.

The collected case studies document human exposure and wildlife loss caused by the improper management or misuse of carbamate products. While only a limited number of the carbamate products have documented damage incidents, they do illustrate the potential ecological effects that some carbamate active ingredients can exert if released uncontrolled to the environment. These damage incident reports document contamination in ground water, surface water, air and soil by carbamate products. The Agency currently has a more limited number of damage incidents for the carbamate wastes under consideration for listing. A more extensive discussion of these and additional damage incident reports can be found in risk assessment support document for carbamate wastes included in the docket. See **ADDRESSEES** section.

4. Mobility and Persistence of Constituents in Carbamate Wastes

Mobility is the ability of a constituent to migrate from a waste to a transport medium, such as air, groundwater, or surface water. Persistence is a measure of a constituent's stability or its resistance to degradation in the environment. To assess mobility and persistence, the Agency has identified environmental release and transport pathways representing plausible worst-case management and disposal scenarios. By assessing these pathways, potential exposure can be estimated. Thus, if a constituent is sufficiently mobile and does not degrade as it moves along an environmental pathway, it may potentially reach a receptor and threaten human health and the environment.

The Agency assesses mobility by estimating the concentration at which a constituent could migrate from the waste disposal or storage unit to the underlying aquifer, adjacent soils, or to the air above the unit. The propensity of each specific constituent to either leach, runoff, or volatilize can be estimated using well-established physical parameters as well as historic damage incident cases and transport theories.

To assess the potential hazard posed by the constituents of concern in the wastes, the Agency compared the concentrations of constituents found in the wastes to known [2] health-based levels. The Agency also compared the concentrations that may reach potential human and environmental receptors to the health-based levels. The Agency took into account the possible dilution and attenuation that may occur due to leaching from the waste, movement of waste constituents adsorbed to soil particulates, and subsequent dilution or release to the air as a result of plausible worst-case mismanagement of the waste.

To evaluate the dilution and attenuation associated with leaching from the waste, the Agency considers the physical state of the waste. If the physical state of the waste is solid, the Agency first estimates the leaching rates for the constituents from the waste. A dilution/attenuation factor is applied to account for dispersion in the subsurface from the disposal site into ground water and subsequently to a drinking water source. This dilution and attenuation may occur because of various phenomena, such as hydrolysis, solubility, soil conditions, adsorption onto soil particles, dilution with ground water, and biodegradation to the extent those processes are likely to occur in a plausible worst-case management or disposal scenario.

The Agency believes that liquid wastes are mobile if improperly disposed and that they may reach environmental receptors through groundwater transport or through direct overland flow. The carbamate wastes proposed for listing can be either solids or liquids at ambient temperature.

Ground-water fate and transport have been evaluated by EPA. Evaluations of ground-water transport were conducted in support of the Toxicity Characteristic (TC) (55 FR 11798). In the final TC rule promulgated on March 29, 1990, EPA determined that a dilution and attenuation factor of 100 was appropriate for a reasonable worst-case management of non-specific wastes that may be disposed of in municipal landfills. The factor of 100 was determined assuming no adsorption, or degradation of a chemical.

In assessing the intrinsic risks associated with carbamate wastes, the Agency compared concentrations of constituents found in the wastes to 100 times their HBLs. While many carbamate active ingredients may exhibit break down through rapid hydrolysis at pH extremes or other degradation in the environment, they can be highly mobile in the soil column, and have been documented to reach ground water where these mitigating effects of hydrolysis/degradation are slowed. The factor of 100 times the HBL (i.e., assuming a dilution factor of 100X) in the case of carbamate waste constituents is viewed as a screening level representing a potential level of concern that would warrant further analysis to better quantify potential risks.

Table 12 shows that certain of these wastes contain sufficient levels of the constituents of concern to warrant further analysis. Given the high concentrations of the constituents of concern in comparison to HBLs, the Agency believes that there is the potential for exposure to harmful concentrations of the constituents of concern should the wastes be mismanaged.

TABLE 12.—SUMMARY OF STREAMS EXCEEDING 100 x HBL CONSTITUENT

Waste group	Percentage by waste volume containing hazardous constituent above 100 x HBL	Percentage by number of streams containing hazardous constituent above 100 x HBL
1	82.8	47
2	97.2	88
3	0.75	30.4
4	98.1	64.7
5	99.4	70
6	100	100
7	11.1	51.7
8	0.01	0.16
9	46.2	80
10	87.6	85.7

The mobility of carbamate active ingredients in the soil column is documented in the Agency's Federal Reporting Database System, maintained by the EPA Office of Groundwater and Drinking Water. This database tracks groundwater monitoring data reported from both known pesticide spills and as a result of normal applications. Carbamate active ingredients have been found in the groundwater of 19 states. Concentrations above health base levels of concern have been measured for aldicarb, carbofuran, and oxamyl. (For additional damage incidents cases and details, see the Carbamate Health Assessment Document and associated materials available in the Public Docket at EPA Headquarters. See **ADDRESSES** section, and section III.C.3.) EPA's overall approach to damage case information and the relationship of carbamate active ingredient damage

[2] The Agency acknowledges that it lacks health assessment studies for every substance determined to be present in the wastes sampled as indicated by the data gaps in Table 11. Health assessment studies are and ongoing process where by future studies may uncover additional information not considered in today's rulemaking.

cases to carbamate wastes is discussed earlier in this preamble.

When assessing the air pathway, constituents must be evaluated considering the waste management and transport scenario to determine if they are sufficiently mobile to support an air plume capable of threatening human health. The key parameters used to estimate the mobility of constituents into the air are the vapor pressure of the pure substance and the Henry's Law Constant [3] of the compound.

The Agency has evaluated several air release scenarios using these parameters and has found that a number of constituents present in carbamate wastes, including benzene, chloroform, formaldehyde, methyl chloride, methyl ethyl ketone, methylene chloride, pyridine, triethylamine, and xylene, may present a threat to human health by the air transport pathway. These air transport assessments are consistent with the assessments used by the Agency in its air emissions rule (56 FR 335490, July 22, 1991, "Hazardous Waste Treatment Storage and Disposal Facilities: Emission Standards of Tanks, Surface Impoundments, and Containers: Proposed Rule) and use the Quiescent Surface Model for Inorganic Wastes and the Oil Film Model for Organic Waste to estimate releases from tanks and materials balance calculations for incineration. These models are explained in detail in "Hazardous Waste Treatment, Storage and Disposal Facilities (TSDF) Air Emission Models," Office of Air Quality Planning and Standards, Research Triangle Park, NC. EPA–450/3–87–0026. The model and documentation are included in the docket supporting this proposed rule. See ADDRESSES section.

Evaluation of the air transport assessments can be found in the document Assessment of Risk from the Management of Carbamate Waste and associated materials available in the Public Docket at EPA Headquarters. See ADDRESSES section. The risks associated with the air pathway are further discussed in section III.C.5.

Persistence can be evaluated by considering the various rates of degradation or adsorption that affect the compound during transport. A number of factors can potentially degrade or attenuate a compound during transport. Many of these processes, including biodegradation, photolysis, and adsorption, affect constituent concentrations under certain situations. Under plausible worst-case waste management scenarios, these processes and many others cannot be relied upon to attenuate constituents, because of the limited circumstances under which these mitigating processes could exist.

Table 13 presents the relevant hydrolysis half-lives of each compound in water and air.

TABLE 13.—PERSISTENCE OF CONSTITUENTS OF CONCERN

Constituent	Hydrolysis half-life in water	Hydrolysis half-life in air
Acetone	20 hours	22 days.
Acetonitrile (2)	5.5 days	—
Acetophenone	—	—
Aniline	—	—
Benomyl	<1 week	1 hour.
Benzene (1)	170 hours	17 hours.
Butylate	—	—
Cadmium	—	—
Carbaryl	10.5 days	12 hours.
Carbendazim	—	—
Carbofuran	8.2 weeks	4 hours.
Carbon disulfide.	2 hours	9 days.
Carbon tetrachloride (1).	1,700 hours	1,700 hours.
Carbosulfan	—	—
Chlorobenzene (1).	1,700 hours	170 hours.
Chloroform (1)	1,700 hours	1,700 hours.
Cycloate	—	—
Dibutylamine	12.9 hours	4.4 hours.
o-Dichlorobenzene (1).	1,700 hours	550 hours.
Dimethylamine	1.5 days	5.9 hours.
Eptam	—	—
Hexane	550 hours	17 hours.
Isopropyl alcohol.	5.4 days	1 day.
Lead	—	—
Methanol	2 days	17.8 days.
Methomyl	38 weeks	1.14 months.
Methylamine	1.9 days	22 hours.
Methyl ethyl ketone.	12 days	2.3 days.
Methyl isobutyl ketone.	33 hours	15 hours.
Methyl chloride (1).	2.4 to 24 hours	168 to 672 hours.
Methylene chloride (3).	686 years	Several months.
Methylisothiocyanate.	—	—
Molinate	—	—
Naphthalene (1).	170 hours	17 hours.
o-Phenylenediamine.	—	—
Pebulate	—	—
Phenol	4 days	15 hours.
Pyridine	90 hours	32 days.
Sodium n-methyldithiocarbamate.	—	—
Tetralin	—	—
Toluene (1)	550 hours	17 hours.
Vernolate	—	—
Xylene (1)	550 hours	17 hours.
Zinc	—	—
Ziram	—	—

—No Data

Unless otherwise specified, all values are from: Howard, Philip H., ed. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals.* 1991.

(1) Mackay, Donald et al. *Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals.* 1992.

(2) J. Jackson Ellington et al. *Measurement of Hydrolysis Rate Constants for Evaluation of Hazardous Waste Land Disposal: Volume 2. Data on 54 Chemicals.* 1987. U.S. EPA, Office of Research and Development. EPA/600/3–87/019.

(3) J. Jackson Ellington et al. *Chemical Specific Parameters for Toxicity Characteristic Contaminants.* 1991. U.S. EPA, Office of Research and Development. EPA/600/3–91/004.

In the case of dithiocarbamates, thermal decomposition, hydrolysis, and oxidation can lead to the formation of additional toxic chemicals of concern. Dithiocarbamic acids are extremely reactive and are commonly reacted to form more stable salts. Decomposition products include carbon disulfide, hydrogen disulfide, alkylisothiocyanates such as methylisothiocyanate, and amines. These amines react with nitrogen oxides from the air or other nitrosating ingredients to form highly toxic nitrosoamines. The carcinogenic potential of a number of these nitrosoamines has been studied and found to be significant. The Agency, therefore, believes dithiocarbamate chemicals typically exhibit the characteristic of reactivity and that discarded dithiocarbamate products, off-specification species, container residues, and spill residues of dithiocarbamate products should be managed as reactive hazardous wastes.

5. Risk Analysis

In support of this proposed rulemaking, the Agency estimated the risks that the constituents and waste streams pose to human health and the environment. A more detailed presentation is included in two background documents entitled, "Carbamate Waste Listing Support: Health Effects Background Document" and "Assessment of Risk from the Management of Carbamate Waste," which are included in the docket for this proposed rulemaking. See ADDRESSEES section. The results of the risk assessment are summarized in this section.

[3] Henry's Law Constants are physical chemistry constants which equate the vapor pressure of a slightly soluble gas in contact with a definite mass of liquid at a given temperature.

a. *Baseline Waste Management Practices and Release Potential of Constituents of Concern.* For each proposed waste group, waste management scenarios were developed based on current industry practices. In developing these scenarios, waste management practices, waste management units, treatment processes, and the quantities of waste being managed were identified. For each waste group, RCRA § 3007 questionnaire data which identify waste descriptions, waste quantities, waste management methods, and waste management units were compiled. Site visit reports provided an additional source of information.

Based on this information and best engineering judgment, six waste management practices and the sequence of management units that would be associated with each practice were identified as follows:

(1) Recycled Wastes—covered tank treatment/recycled;
(2) Incinerated Wastes—open tank storage/industrial boiler/landfill ash;
(3) Wastewater Treatment Process Waste—open quiescent or aerated treatment tank; [4]
(4) Fuel Blended Wastes—covered treatment tank;
(5) Landfilled Wastes—open storage tank/landfill wastes; and
(6) Other—open quiescent treatment tank or impoundment.

Table 14 identifies baseline waste management practices and the quantity of the waste groups going to each management practice.

TABLE 14.—APPORTIONMENT OF WASTE STREAM QUANTITIES TO BASELINE MANAGEMENT PRACTICES

Waste codes	Current management practices	Percentage of waste stream
Waste group 1.	Covered Trt. Tank/Recycle	1.
	Open St. Tank/Boiler/Landfill Ash	8.
	WWTP—Open Quiescent Trt. Tank	91.
Waste group 2.	Open St. Tank/Boiler/Landfill Ash	1.
	WWTP—Aerated Trt. Tank	99.
Waste group 3.	Covered St. Tank/Recycle	2.
	Open St. Tank/Boiler/Landfill Ash	1.
	Open St. Tank/Landfill	97.
WWT sludges.	Other—Open Quies. Trt. Impoundment	Less than 1.
	Open St. Tank/Landfill	Greater than 99.
Waste group 4.	Open St. Tank/Boiler/Landfill Ash	100.
Waste group 5.	WWTP—Open Quies. Trt. Tank	100.
Waste group 6.	Open St. Tank/Landfill	100.
Waste group 7.	Covered Trt. Tank/Recycle	1.5.
	WWTP—Open Quies. Trt. Tank	97.
	Other—Open Quies. Trt. Tank	1.5.
Waste group 8.	Covered Trt. Tank/Recycle	Less than 1.
	Open St. Tank/Boiler/Landfill Ash	Less than 1.
	WWTP—Open Quies. Trt. Tank	Greater than 99.
	Other—Open Quies. Trt. Tank	Less than 1.
Waste group 9.	Covered Trt. Tank/Recycle	Less than 1.
	Open St. Tank/Boiler/Landfill Ash	Less than 1.
	Open St. Tank/Landfill	53.
	Covered Trt. Tank—Fuel Blending	Less than 1.
	Other—Open Quies. Trt. Tank	46.
Waste group 10.	Covered Trt. Tank/Recycle	49.
	Open St. Tank/Boiler/Landfill Ash	27.
	Covered Trt. Tank—Fuel Blending	6.
	Other—Open Quies. Trt. Tank	18.

[4] The RCRA section 3007 questionnaire data indicated that some wastes were being deepwell injected. However, EPA has received subsequent information that due to the expiration of the facility's deepwell permit these wastes will no longer be deepwell injected but will be sent to wastewater treatment processes once a NPDES discharge is approved. Therefore, waste reported as deepwell injected were assumed to be sent to wastewater treatment.

b. *Exposure Pathway Analysis.* For each constituent of concern in each waste group, physical, chemical, and biological properties that can be used to predict environmental persistence, mobility, and bioaccumulation of constituents were identified. These properties include aqueous solubility, octanol water partition coefficient,[5] soil adsorption coefficient, vapor pressure, Henry's Law Constant, bioconcentration factor for fish tissue, bioaccumulation factor for meat and dairy products, air degradation value, and plant uptakes and adherence values. The majority of the collected values were obtained from available literature. In the absence of reported data, estimation methods [6] were used to calculate input parameter values.

For this analysis, all potential exposure pathways were identified for each constituent in each waste stream using information on physical and chemical properties of a constituent, and physical and chemical properties that are associated with persistence and mobility in a specific pathway. For example, a pathway in which a chemical is released from a tank to the air, is transported through the air to the exposed individual, and is directly inhaled by humans would be driven primarily by vapor pressure and Henry's Law Constant. Constituents with high vapor pressures and Henry's Law Constants (such as volatile organic compounds) would be expected to be present in this pathway, where as constituents with low values for these properties (such as metals) would not be expected to show up in this pathway. Damage incident cases and baseline management practices also were examined to determine which constituents have been released to the environment at concentrations presenting a concern and to determine which media and exposure pathways are potentially significant, or are reasonably expected to be released to the environment. For each waste group, Table 15 shows the number of potential exposure pathways identified using this screening method.

[5] The octanol water partition coefficient is the ratio of a chemical's concentration in the octanol phase to its concentration in the aqueous phase of a two-phase octanol/water system. Values represent the tendency of the chemical to partition itself between an organic phase and an aqueous phase.

[6] The principle source of estimation methods for input parameters was the "Handbook of Chemical Property Estimation Methods: Environmental Behavior of Organic Compounds" by Warren L. Lyman, William F. Reel, and David H. Rosenblatt, published by McGraw-Hill Book Company in 1982.

TABLE 15.—NUMBER OF POTENTIAL EXPOSURE PATHWAYS IDENTIFIED FOR EVALUATION

Waste stream	Number of constituents of concern	Number of potential exposure pathways
Waste group 1	30	25
Waste group 2	39	31
Waste group 3	4	15
Waste group 4	13	20
Waste group 5	6	18
Waste group 6	14	18
Waste group 7	12	30
Waste group 8	20	31
Waste group 9	17	28
Waste group 10	9	26
WWT sludge	7	5

Based on baseline management practices and damage incident reports, all relevant exposure pathways identified were evaluated for inclusion in the risk analysis. The background document for the risk analysis (Assessment of Risk from the Management of Carbamate Waste) examines potential pathways for specific constituents of concern. Those pathways determined to be plausible were identified for further assessment and only the exposure routes associated with these pathways were considered to be potential exposure routes. These routes included direct inhalation, indirect inhalation of soil and dust, direct soil ingestion, indirect soil ingestion, ingestion of ground-water, ingestion of surface water, ingestion of crops, ingestion of animal/dairy products, and ingestion of fish and shellfish.

c. *Risk Estimates.* i. Overview. In conducting the risk analysis, EPA calculated risk estimates for each waste group/management unit/exposure pathway/exposure route combination. (An example would be direct inhalation of a constituent from Group 1 waste that has been emitted as a gas from a treatment tank.) One exception to this methodology concerned those wastes identified with the following waste management sequence: tank storage/ boiler/landfill ash. Preliminary analysis of this exposure route indicated that constituents released from the ash portion of this waste managed in landfills would not pose risks at or above levels of concern for the most exposed individuals (i.e., a risk of 1 in a million for carcinogens or a hazard quotient of one or greater). This level of risk ($<10^{-6}$ for carcinogens or a hazard quotient of <1) is beneath the lower bound of EPA's regulatory level of concern for hazardous waste listing, and for this reason, risk estimates for the portion of waste being landfilled as ash were not made.

The Agency developed baseline risk estimates by selecting plausible mismanagement practices based on information collected in the RCRA 3007 survey for current management operations. For wastewaters, the Agency selected the plausible mismanagement practice to be the current practice of storage and treatment in tanks and boilers. The Agency has no information or reason to believe that if not listed, the wastewaters would likely be managed in a different manner (e.g., unlined surface impoundment). The Agency believes firms would not switch to less protective management methods, such as unlined surface impoundments, because it would be expensive to do so. For sludges and waste solids, the Agency selected the plausible mismanagement to be an unlined industrial landfill. The Agency has information that a portion of these wastes, while not regulated as hazardous, are managed as hazardous with disposal in Subtitle C landfills. However, the Agency lacks adequate information showing, that if not listed as hazardous, the wastes would continue to be disposed in Subtitle C landfills and result in significantly lower estimates of potential risk. The Agency requests comment on this approach to modeling plausible mismanagement practices.

Risk characterization approach. The risk characterization approach follows the recent EPA Guidance on Risk Characterization (Habicht, 1992) and Guidance for Risk Assessment (EPA Risk Assessment Council, 1991). The guidance specifies that EPA risk assessments will be expected to address or provide descriptions of (1) individual risk to include the central tendency and high-end portions of the risk distribution, (2) important subgroups of the population such as highly exposed or highly susceptible groups or individuals, if known, and (3) population risk. In addition to the presentation of results, the guidance also specifies that the results portray a reasonable picture of the actual or projected exposures with an open discussion of uncertainties.

Individual risk. Individual risk descriptors are intended to convey information about the risk borne by individuals within a specified population and subpopulations. These risk descriptors are used to answer questions concerning the affected population, the risk levels of various groups within the population, and the average risk for individuals within a population of interests. The approach used in this analysis for characterizing baseline individual risk included: (1) identifying and describing the population of concern for each exposure route and important subpopulations that would exhibit much higher exposure patterns; (2) conducting screening analyses to obtain bounding and high-end estimates and to determine the sensitivity of the model parameters used in the risk estimation; (3) estimating central tendency and high-end values for the most sensitive parameters in the risk estimation procedures; and (4) calculating risk for each pathway that provide a characterization of the average individual risk and high-end risk descriptors.

Bounding estimates. Screening estimates of risk are developed to determine whether an exposure pathway is of concern and to identify the parameters in the exposure calculation that contribute most to the certainty of the estimate. An initial screening estimate conducted for the potential pathways of concern was a bounding estimate. "Bounding estimates" purposefully overestimate the exposure or dose in an actual population for the purpose of developing a statement that the risk is "not greater than x." These bounding estimates were used to focus the analysis of central tendency and high end risk estimates on the most important pathways and constituents in these pathways.

Following the bounding estimate, all of the parameters used in risk estimation for each of the exposure pathways were systematically evaluated for their relative influence on the risk estimates. This sensitivity analysis provides information as to which of the parameters are the most important to include in the risk analysis.

Central tendency estimates. The central tendency risk descriptors are intended to provide a characterization of risk for the typical situation in which an individual is likely to be exposed. For each waste stream/management practice/constituent/ pathway combination, a central tendency estimate was made. Parameter values for waste stream characteristics, management unit characteristics, environmental fate and transport properties and exposure scenarios were all set at a central tendency value simultaneously.

High-end estimates. The "high-end" of the risk distribution is, conceptually, above the 90th percentile of the actual (either measured or estimated) distribution. As described in the 1992 EPA Risk Assessment Guidance for Risk Managers and Risk Assessors:

The high-end risk descriptor is a plausible estimate of the individual risk for those persons at the upper end of the risk distribution. The intent of this descriptor is to convey an estimate of risk in the upper range of the distribution, but to avoid estimates which are beyond the true distribution. Conceptually, high-end risk means risk above the 90th percentile of the population distribution, but not higher than the individual in the population who has the highest risk. High-end estimates focus on estimates of exposure or dose in the actual population. (EPA Risk Assessment Council, 1991)

The "high-end" risk descriptor is intended to estimate the risk that is expected to occur in a small but plausible high-end segment of the population. The individuals with high-end risk may be members of a special population segment or individuals in the general population who are highly exposed.

If only limited information on the exposure or dose factors is available, the guidance recommends an approach for estimating high-end exposure or risk that identifies the most sensitive parameters and then uses maximum or near maximum values for one or a few of these variables, leaving others at their mean values. The guidance states that maximizing all variables will, in virtually all cases, result in an estimate that is above the actual values seen in the population.

For this analysis, data on exposure were generally not available for estimating specific percentiles of the exposed population for any of the pathways. Nonetheless, limited data were available to develop high-end estimates following the approach described above. All exposure factors for each of the pathways of concern [7] were identified and sensitivity analyses were conducted to identify those parameters that are the most sensitive in the risk estimation process. Based on these sensitivity analyses, a matrix was developed for each exposure pathway of concern that included all of the important parameters. A base case was then established using the arithmetic mean and median values for all of the parameters; this approach provided the average estimate. Then, each parameter was varied using a high-end value while keeping all other parameters at their mean or median value. These were considered high-end estimates of risk.

Upper-tail estimates. An upper-tail estimate is conceptually above the 99th percentile of the cumulative risk distribution. It represents an extreme case, which could occur but is not probable. The EPA developed upper-tail estimates by varying two parameters at the same time using high-end values while keeping all other parameters at their mean or median value. Parameters were varied in a way that did not present inconsistencies, such as low body weight and high intake rate. Also, combinations of high-end values for two parameters at a time that seemed inconsistent or implausible were eliminated.

Population risk. Descriptors of population risk are intended to convey information about the risk borne by the population or population segment being studied. These risk descriptors are used to answer questions concerning the number of cases of a particular health effect that probabilistically could occur within the population during a given time period, the number of persons or percent of the population above a certain risk level or health benchmark (e.g., RfD or RfC), and risk for a particular population segment.

The calculation of population risk based on estimates of risk for all individuals in the population is very data-intensive and such data are normally not available, as is the case for this analysis. As the 1992 EPA Guidelines for Exposure Assessment (57 FR 22888, May 29, 1992) states:

> . . . although it has been common practice to estimate the number of cases of disease, especially cancer, for populations exposed to chemicals, it should be understood that these estimates are not meant to be accurate predictions of real (or actuarial) cases of disease. The estimate's value lies in framing hypothetical risk in an understandable way rather than in any interpretation of the term cases.

The population risk estimates for each exposure route addressed in this analysis were based on this approach. The exposure routes described above have associated populations or subpopulations that are distinct, although not necessarily mutually exclusive. For this analysis, population data were collected to approximate the potential number of individuals exposed within a 10 mile radius of a representative facility. Data were collected for land surrounding eight existing carbamate facilities. Population distributions within the eight study areas were then computed using 1990 census tract-level population data to estimate the total number of persons within each study area, as well as subpopulations, including children.

Using these data and central tendency individual risk estimates or hazard quotients (i.e., the ratio of the predicted concentration to the applicable health based level), population risk estimates were calculated. However, for inhalation risk, an overlay of estimated concentration in 160 sectors surrounding a facility was used to more accurately estimate population risk.

ii. Bounding Estimates for Individual Risk. The results of the baseline bounding assessment are provided in the risk assessment support document, "Assessment of Risk from The Management of Carbamate Waste" (RTI, 1993). In conducting the bounding estimates all input parameters were set at high-end values. The bounding estimates were used to identify management practice/constituent/pathway combinations for each waste group that could potentially present risk to individuals at levels of concern. Two general results are of particular importance from this analysis. First, all food chain pathways were found to result in human health risk below levels of concern for all constituents in all waste groups. Second, EPA developed bounding risk estimates for wastewaters and organic liquids managed in surface impoundments from the production of carbamates, thiocarbamates and dithiocarbamates assuming an unlined impoundment. Risks exceeding $1x10^{-6}$ or a hazard quotient of 1 were predicted for ground water ingestion of constituents in waste groups 1 and 2. However, since no case could be documented of untreated waste from groups 1 and 2 currently being managed in unlined surface impoundments, this management scenario was not included for further evaluation in the baseline risk analysis.

iii. Risk Estimates by Exposure Route, Waste Group and Management Practice. This section discusses baseline individual and population risk estimation for direct inhalation, direct soil ingestion, indirect soil ingestion, and ingestion of ground water. For each waste management unit/exposure route combination, the methodologies used in calculating individual and population risk and the resulting risk estimates are presented. The waste/management practice/constituent/pathway combinations discussed in this section include only those with bounding risk estimates of $1x10^{-6}$ or greater for carcinogens and a hazard quotient of 1 or greater for noncarcinogens.

[7] High end estimates were made for only those pathways/constituents associated with a bounding risk estimate of 1×10^{-6} or greater for carcinogens or a bounding hazard quotient of 1 or greater for noncarcinogens. For a chemical constituent of concern, a hazard quotient is the ratio of chemical's waste stream concentration to its reported toxicity benchmark. A quotient of 1 shows that the toxicity benchmark was *not* exceeded.

Direct Inhalation

Individual risk estimates for tanks. The methodology used to estimate risk from the direct inhalation of contaminants by humans is based on the premise that humans live in close proximity to a facility where wastes are managed in tanks. The potential exists for humans to be exposed to hazardous constituents that volatilize from the wastes in the tanks.

For this analysis, EPA estimated the typical and high-end ambient air concentrations using air emission and dispersion models. The EPA model CHEMDAT7 was used for air emissions, the EPA Industrial Source Long Term model (version 2) (ISCLT2) was used for emission dispersion.

For each waste group/management practice/exposure route, Table 16 presents the high-end and central tendency risk estimates for those constituents identified presenting risk at levels of concern (i.e., having a high-end risk estimate greater than or equal to 1×10^{-6} for carcinogens or a hazard quotient greater than or equal to 1 for noncarcinogens). Table 16 also identifies the parameters that significantly defined the lower and upper boundaries of the high-end range.

A detailed discussion of the methodology used to estimate exposure and the various air modeling assumptions and values of the input parameters for high-end and central tendency exposures is found in the risk assessment background document. A sensitive parameter in the air modeling is the distance from the emissions source to the receptor. The Agency used distances of 250 feet and 1000 feet to represent high-end and central tendency receptor distances,[8] respectively. The Agency specifically requests comments on the appropriateness of using these distances in the analysis. The Agency also requests comment on the exposure assumptions for a receptor living in the vicinity of the waste streams being considered in today's proposal. Information requested includes length of time an individual dwells at any one residence in these areas and the amount of time (number of days a year, hours per day) an individual spends in and around the residence.

TABLE 16.—INDIVIDUAL RISK ESTIMATES FOR DIRECT INHALATION: TANKS

Waste No.	Management practice	Constituent of concern	High-end parameters single/double	High-end risk estimate	High-end hazard quotient	Central tendency	
						Risk estimate	Hazard quotient
Waste Group 1 ..	Covered Treatment Tank/Recycle.	Triethylamine	Recept. distance/tank & recept. distance.	NA	4–30	NA	1
Waste Group 1 ..	Open Tank Storage/ Boiler/Landfill Ash.	Methylene Chloride	Recept. dist./conc. & recept. distance.	3E–07—1E–06	NA	3E–08	NA
		Triethylamine	Recept. dist./recept. distance & met. data.	NA	20–40	NA	2
Waste Group 1 ..	WWTP—Open Quiescent Treatment Tank.	Formaldehyde	Quantity/tank & recept. distance.	3E–06—1E–05	NA	6E–07	NA
		Methylene Chloride	Conc./tank & exposure duration.	1E–05—5E–05	NA	3E–06	NA
		Triethylamine	Met data/tank & recept. distance.	NA	500–2000	NA	200
Waste Group 2 ..	WWTP—Aerated Tank.	Carbon Disulfide ...	Quantity/quantity & recept. distance.	NA	0.4–2	NA	0.07
		Carbon Tetrachloride.	Recept. distance/ recept. dist. & expo. dur.	2E–06—7E–06	NA	4E–07	NA
		Chloroform	Quantity/quantity & recept. distance.	1E–06—7E–06	NA	2E–07	NA
		Methyl Chloride	Quantity/conc. & quantity.	4E–05—2E–04	NA	7E–06	NA
		Methyl Ethyl Ketone.	Recept. distance/ conc. & recept. dist.	NA	0.2–1	NA	0.04
		Methylene Chloride	Conc./conc. & quantity.	9E–06—5E–05	NA	9E–07	NA
		Pyridine	Recept. distance/tank & conc.	NA	3–20	NA	0.6
		Triethylamine	Recept. distance/ conc. & distance.	NA	40–200	NA	7
Waste Group 3 ..	Open Tank Storage/ Landfill.	Chloroform	Recept. distance/ recept. dist. & expo. dur.	4E–06—1E–05	NA	4E–07	NA
		Methylene Chloride	Recept. distance/ recept. dist. & expo. dur.	4E–07—1E–06	NA	5E–08	NA
Waste Group 4 ..	Open Tank Storage/ Boiler/Landfill Ash.	Benzene	Recept. distance/ recept. dist. & expo. dur.	5E–05—2E–04	NA	6E–06	NA

[8] From "Hazardous Waste Treatment, Storage, and Disposal Facilities-Organic Air Emissions Standards for Process Vents an Equipment Leaks Final Rule", 55 FR 25454, June 21, 1990.

Population risk estimates for tanks. To estimate the population risk associated with direct inhalation of volatile constituents, the number of individuals that may potentially be exposed over a 70 year period was estimated. Using typical case exposure conditions, population risk was then calculated for each waste/constituent of concern/waste management practice combination. For each combination, estimates were made for individuals exposed in all directions (i.e., north, south, east, and west) out to 10 miles. Exposure concentrations were estimated at 0.25, 0.5, 1.0 miles from the modeled facility in each direction and at 1.0 mile incremental distances thereafter. The number of exposed individuals in each sector is an average of the population data collected at eight carbamate production facilities. For carcinogens, the number of cancer cases occurring over 70 years were calculated based on the individual risk, number of exposed individuals, and number of 9 year cohorts in a 70 year time period. For noncarcinogens, the total number of people exposed to constituent concentrations greater than or equal to the RfCs were identified. For each combination, the estimates were summed across all directions and out to 10 miles to obtain the population risk (Table 17).

TABLE 17.—POPULATION RISK ESTIMATES: TANKS

Waste codes	Current management practices	Constituent of concern	Cancer cases/70 years	People exposed over RfC per 70 yrs
Waste Group 1 ..	Covered Trt. Tank/Recycle	Methylene chloride	1.5E–04	NA
		Triethylamine.	NA	73
	Open St. Tank/Boiler/Landfill Ash	Formaldehyde	2.8E–05	NA
		Methylene chloride	1.4E–04	NA
		Triethylamine	NA	73
	WWTP—Open Quiescent Trt. Tank	Chloroform	1.4E–04	NA
		Formaldehyde	4.8E–03	NA
		Methylene chloride	2.8E–02	NA
		Triethylamine	NA	54,000
Waste Group 2 ..	Open St. Tank/Boiler/Landfill Ash	Methyl chloride	1.3E–05	NA
		Methylene chloride	2.3E–06	NA
	WWTP—Aerated Trt. Tank	Carbon tetrachloride	7.7E–04	NA
		Chloroform	1.2E–03	NA
		Formaldehyde	6.2E–05	NA
		Methyl chloride	3.4E–02	NA
		Methylene chloride	4.4E–03	NA
		Triethylamine	NA	390
Waste Group 3 ..	Open St. Tank/Landfill	Chloroform	1.9E–03	NA
		Methylene chloride	2.3E–04	NA
Waste Group 4 ..	Open St. Tank/Boiler/Landfill Ash	Benzene	2.7E–02	NA
Waste Group 6 ..	Open St. Tank/Landfill	Benzene	1.4E–04	NA

Individual risk estimates for boilers. As discussed above for tanks, the methodology used to estimate baseline individual risk from the direct inhalation of contaminants by humans is based on the premise that humans live in close proximity to a facility where wastes are managed. The potential also exists for humans living in close proximity to a facility to be exposed to hazardous constituents that are emitted from industrial boilers, furnaces or incinerators burning the wastes.

Results from air emission and dispersion modeling using ISCLT2 were used to develop boiler-specific scaled modeled air concentrations (SMACs) for use in calculating ambient air concentrations. These scaled modeled air concentrations represent the downwind concentrations normalized by the feed rate that would result if the boiler emission rate is 1 gram per second (g/s). The SMACs were multiplied by the waste constituent concentrations, estimations of the fraction of the boiler feed that the waste comprised, and a specified destruction and removal efficiency (DRE) to calculate ambient air concentrations. The high-end air concentrations were estimated based on high-end waste constituent concentrations and the boiler-specific coefficient associated with the high-end boiler and meteorological data. The methodology used in calculating the typical case air concentrations used typical case values for the waste constituent concentrations and boiler-specific coefficient. Based on the high end estimates, the potential risk posed by the majority of the constituents in the wastes going to boilers is below levels of concern. The only constituent shown to be of concern (i.e., having a high-end risk estimate greater than or equal to 1×10^{-6} for carcinogens or a hazard quotient greater than or equal to 1 for noncarcinogens) is benzene in waste Group 4. The central tendency and high end range for this constituent are 9×10^{-8} and 4×10^{-7} to 1×10^{-6}, respectively.

Population risk estimates for boilers. Using typical case exposure conditions, EPA estimated the population risk for each waste group/constituent of concern combination for waste managed in boilers, using a methodology similar to that used for air emissions from tanks (Table 18).

TABLE 18.—POPULATION RISK ESTIMATES: BOILERS

Waste codes	Current management practices	Constituent of concern	Cancer cases/70 years	People exposed over RfC per 70 yrs
Waste Group 1 ..	Open tank storage/boiler/landfill ash	Methylene chloride	8.9E–01	NA
Waste Group 2 ..	Open tank storage/boiler/landfill ash	Chloroform	2.0E–07	NA
		Methyl chloride	5.7E–06	NA
		Methylene chloride	7.5E–07	NA
Waste Group 3 ..	Open tank storage/boiler/landfill ash	Methylene chloride	5.7E–08	NA
Waste Group 4 ..	Open tank storage/boiler/landfill ash	Arsenic	9.6E–04	NA
		Benzene	3.4E–03	NA
Waste Group 8 ..	Open tank storage/boiler/landfill ash	Chromium	4.3E–06	NA
		n-Nitrosodibutylamine	1.5E–07	NA
		n-Nitrosodimethylamine	1.4E–04	NA
Waste Group 9 ..	Open tank storage/boiler/landfill ash	Arsenic	2.4E–08	NA
		Cadmium	2.0E–08	NA
		Chromium	4.2E–08	NA
Waste Group 10	Open tank storage/boiler/landfill ash	Chromium	8.2E–07	NA

Individual risk estimates for landfills. The equations used to generate the hazard quotients and risk resulting from inhalation of volatiles were consistent with those presented in EPA's Risk Assessment Guidance for Superfund (RAGS Part B, 1991). The central tendency risk estimates were derived from a 30 year average atmospheric concentration and a 9 year exposure duration. A 30 year exposure duration was used as a high-end exposure duration value when generating the high-end risk estimates.

Central tendency and high-end risk estimates were generated for those constituents with a bounding risk estimate greater than 10^{-6} and a bounding hazard quotient estimate greater than or equal to 1 (Table 19).

TABLE 19.—INDIVIDUAL BASELINE RISK FROM INHALATION OF VOLATILES: LANDFILLS

Waste codes	Current management practices	Constituent of concern	Risk		High-end parameters
			High-end	Central	
Waste Group 3 .	Landfill	Chloroform	8E–05—1E–04	2E–05	Receptor distance and exposure duration.
		Methylene chloride	1E–05—2E–05	3E–06	Receptor distance and exposure duration.
Waste Group 6 .	Landfill	Benzene	1E–05—2E–05	4E–06	Receptor distance and exposure duration.

Population risk estimates for landfills. Population risk for the inhalation of volatile emissions from the landfill is a function of individual risk from inhalation of volatile contaminants and the number of people living in the area where exposure will occur. The population risks were based on centrally tendency risk estimates for individuals.

A sensitive parameter for many of the landfill pathways is the volume and management of the wastes sent to a landfill. To calculate the volatile emissions, waste run-off, and particle generation, EPA assumed the disposal of an annual quantity for each waste stream. The waste is allowed to remain uncovered while the portion of the landfill is active. EPA estimates that the landfill disposal depth is 3 meters and that the density of the waste is 150 kg/m^3, a value resembling highly organic, muck soils. EPA requests comments on these assumptions or any data on these assumptions.

As discussed above regarding population risk estimates from direct inhalation, the number of people living at various distances from a facility were also evaluated for the population risk estimates. A total of 493 people were determined to live within 0.3 miles of the facility. The central tendency risk estimates used in the baseline analyses incorporated a 30 year average air concentration.

The population risk estimates for constituents of concern in waste group 3 are 8×10^{-2} cases over a 70-year period for chloroform, and 1×10^{-2} cases over a 70-year period for methylene chloride. The population risk for benzene, the constituent of concern in waste group 6, is estimated at 2×10^{-2} cases over a 70-year period.

Individual risk estimates for surface impoundments. The sludge waste group was the only untreated waste group currently being managed in surface impoundments. The bounding risk estimates for those constituents in the sludge waste group were below levels of concern. Therefore, further risk evaluations were not required.

Population risks estimates for surface impoundments. The bounding risk estimates did not indicate any constituents of concern. Therefore, further risk evaluations were not required.

Direct Soil Ingestion

Individual risk estimates for landfills. The equations used to quantify risks resulting from ingestion of contaminated soil are consistent with those soil ingestion risk equations contained in EPA RAGS Part B. The exposure durations of 9 years and 30 years were used to represent central tendency and high-end. Obviously, this exposure duration could occur during various stages of life. For this analysis, it was assumed that 6 years of the exposure period was during childhood when soil ingestion is estimated to be highest. This is consistent with the RAGS Part B methodology.

The risk estimates for this pathway are sensitive to the amount of the waste that travels from the landfill to off-site receptors either through run-off or deposition of wind-blown particulates. EPA assumed that landfills do not have run-off controls or that the local terrain, roads, or other engineered controls do not channel run-off from residences.

The Agency requests comment on these assumptions and data on these parameters.

Central tendency and high-end risk estimates were generated for those constituents identified at levels of concern from the bounding risk analysis (Table 20).

TABLE 20.—Individual Baseline Risk From Direct and Indirect Soil Ingestion

Waste codes	Current management practices	Constituent of concern	Risk or hazard		High end parameters
			High end	Central	
Waste Group 3 .	Landfill	Methylene chloride	1E–07—2E–07	NA	Soil mixing depth and soil intake rate.
Waste Group 6 .	Landfill	EPTC	4–9	2	Constituent concentration and soil intake rate.
		Molinate	20–40	10	Soil mixing depth and soil intake rate.
Waste Group 9 .	Landfill	Arsenic	3E–06—4E–06	1E–06	Exposure duration and soil intake rate.
		Antimony	600–1000	300	Constituent concentration and soil intake rate.
		Zinc	1–2	0.4	Constituent concentration and soil intake rate.

Population risk estimates for landfills. Population risk estimates for soil ingestion were not evaluated. The EPA concluded that the general population in the vicinity of the facilities would not have access to the facilities. Therefore, the direct soil ingestion route was not considered an exposure scenario warranting population risk estimates.

Indirect Soil Ingestion

Individual risk estimates for landfills. The same risk estimation methodology used to calculate risks from direct soil ingestion was used to calculate risks resulting from indirect soil ingestion. This scenario considered soil that had eroded from the site to a nearby field. Central tendency and high-end risk estimates were generated for those constituents with bounding risk estimates greater than or equal to 10^{-6} or hazard quotients greater than or equal to 1 (Table 20).

Ingestion of Ground Water

Individual risk estimates for landfills. The equations used to calculate risk resulting from the ingestion of contaminated ground water were consistent with those presented in EPA's RAGS Part B. The ground-water concentration used in the central tendency and high-end risk estimates reflects a 30 year average ground-water concentration. The Multimedia Exposure Assessment Model (MULTIMED), an EPA analytical model, was used to estimate the various contaminants at specific receptor points downgradient from the source for a variety of scenarios. A full discussion of the model and inputs used for this analysis is contained in the report, "Assessment of Risk from the Management of Carbamate Waste" (RTI, 1993), which is available in the docket for this proposed rule. See **ADDRESSES** section.

Central tendency and high-end risk estimates were generated for those constituents with bounding risk estimates greater than or equal to 10^{-6} or hazard quotients greater than or equal to 1 (Table 21).

The groundwater modeling analysis assumes that groundwater contamination results from the disposal of waste in an on-site unlined landfill. The Agency collected data on well use surrounding the facility in all directions and assumed that the nearest wells are always downgradient of these facilities. The analysis further assumes that groundwater downgradient of the source may be used for drinking water, these wells are on the centerline of the plume, and these wells draw from only the uppermost aquifer. Given the current practice that most carbamate sludges and waste solids are disposed at off-site landfills, the Agency requests comments on the appropriateness of its assumptions, the resulting risk estimates, and the data used by the Agency.

TABLE 21.—Individual Risk Estimates From Ground-Water Ingestion: Landfills

Waste Code	Current management practice	Constituent of concern	Risk or hazard		High End parameters
			High end	Central	
Waste Group 3 .	Landfill	Chloroform	1E–07—3E–07	1E–08	Landfill area/leachate conc./recharge rate/infiltration rate & distance to well.
		Methylene chloride	3E–06—9E–06	2E–07	Distance to well and exposure duration.
Waste Group 6 .	Landfill	Benzene	5E–07—2E–06	3E–08	Landfill area/leachate conc/recharge rate/infiltration rate and distance to well.
		EPTC	10–50	0.1	Landfill area/leachate conc/recharge rate/infiltration rate and distance to well.
		Molinate	60–70	0.6	Distance to well and neutral hydrolysis rate.

Population risk estimates for landfills. In conducting this analysis, EPA estimated the risk to the exposed population from ingestion of ground-water based on the estimates of the population using water from public or private wells and individual risk estimates. Population risk estimates were generated for those constituents which were quantitatively analyzed for the ground-water exposure route.

The number of people using well water was estimated from the results of a land-use survey around 8 carbamate production facilities. For most of the states in which the study areas are located, little information was available on private well-use.

To characterize the spatial distribution of well-water use, EPA contacted public works officials from the urban centers nearest the study areas to determine which portions of the study areas were served by their

municipal facilities. These officials were then asked whether those areas not served by their public water systems are likely to be on private wells, or whether other smaller public utilities serve those areas.

For those areas where smaller public utilities were in operation, those utilities were contacted. Representatives for those smaller utilities (usually serving rural areas adjacent to urban centers) were asked whether they use well water, or pipe in water from the larger municipalities nearby. In addition, the smaller public utilities were asked whether those areas not receiving their service are on private wells. Through this process, it was possible to identify those areas likely to be on well water (both private and public) and those areas likely to be on non-well water.

The land-use survey was also used to determine the location of the well closest to each of the facilities evaluated in the survey. The average of the well location point closest to each facility was approximately 3.7 miles (5,985 m). This distance to the ground water exposure point was used to generate the central tendency risk estimates required for the population risk estimates. The survey results also indicate that there is a total of 672 people within a 3.7 mile radius of the site who use either public or private wells as their drinking water source. The ground water concentration used to calculate the risk represents a 70-year average ground water concentration.

The population risk estimates for the constituents of concern in waste group 3 are 1×10^{-5} cases over a 70-year period for chloroform and 2×10^{-4} cases over a 70-year period for methylene chloride. For waste group 6, the total number of cases per 70-year period resulting from benzene-contaminated ground water is estimated at 4×10^{-5}. The other constituents in this waste stream which were analyzed, eptam (EPTC), molinate, and toluene had hazard quotients less than 1 and were not analyzed further. The population risk posed by the constituent of concern in waste group 9, arsenic, was not significant.

6. Estimating Hazard Quotients: Dose Response Risk Assessment Techniques for Noncancer Endpoints

Table 11 contains RfDs, RfCs, and observed toxic effects for constituents detected in carbamate wastes. Because the noncarcinogens EPTC (eptam), triethylamine, and ziram were significant to the Agency's risk assessment, the Agency is seeking to further quantify the probability of adverse effects resulting from exposures to these chemicals at levels above hazard quotients. Exposure above the hazard quotient is viewed by the Agency to provide an indication that adverse effects similar to those observed in animal studies could also be observed in the exposed human population. However, the likelihood of particular effects above the RfD or RfC cannot be effectively predicted. The Agency is considering using logistic regression on ordered categories (i.e., categorical regression analysis) to provide estimates of risks at exposure levels above the RfD or RfC, and for the probability of adverse population effects. The following sections present an overview of dose-response assessment and categorical regression. A more detailed discussion of the categorical regression methodology is found in a paper Using Categorical Regression Instead of a NOEAL to Characterize a Toxicologist's Judgment in Noncancer Risk Assessment by Richard C. Hertzberg, Ph.D. and Michael L. Dourson, Ph.D. of EPA's Environmental Criteria and Assessment Office. This paper is available in the docket supporting this proposal. See "ADDRESSES" section.

Dose-Response Assessment. Dose-response assessment follows hazard identification in the risk assessment process as defined by the National Academy of Sciences (1983). Dose-response assessment involves the quantitative evaluation of toxicity data to determine the like incidence of the associated effects in humans. The information available for dose-response assessment ranges from well-conducted and controlled studies on human exposures, epidemiology studies with large numbers of subjects and well-characterized exposures, and supportive studies in several animal species, to a lack of human and animal toxicity data with only structure-activity relationships to guide the evaluation. In any case, the Agency considers all pertinent studies in this process. However, only data of sufficient quality are used in the dose-response assessment of a chemical.

The Chronic Reference Dose (RfD), and Reference Concentration (RfC). Given at least a moderate amount of toxicity data, one risk assessment goal is to determine a level of daily exposure that is likely to be without an appreciable risk of deleterious effects during a lifetime. The Agency's Reference Dose (RfD) and Reference Concentration (RfC) approaches strive to include scientific considerations in their determination.

The Agency defines the chronic RfD as an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. In addition, the Agency is also using this model for inhalation exposures and similarly defines a Reference Concentration (RfC).

The RfD and RfC are useful as reference points for gauging the potential effects of other doses and for estimating hazard quotients. Doses at the RfD or less (consistent with hazard quotients of 1 or less) are not likely to be associated with any health risks, and are, therefore, assumed likely to be of little regulatory concern. In contrast, as the amount and frequency of exposures exceeding the RfD increase (or the hazard quotient exceeds 1), the probability that adverse effects may be observed in a human population also increases. However, the conclusion that all doses below the RfD are acceptable and that all doses in excess of the RfD are unacceptable cannot be categorically stated because these models cannot effectively predict the likelihood of particular effects above the RfD or RfC.

Another risk assessment goal is to determine or estimate the likely human response to various exposure levels of a particular contaminant. For carcinogens, a dose-response model is appropriate if sufficient data exist. Dose response models for noncancer endpoints are just now starting to be used. The next section highlights a new procedure, categorical regression, for which the Agency asks for comments. The Agency is interested in receiving comments on the categorical regression technique as applied to estimating the probability of effect above a benchmark level, and also on the appropriateness of using this technique in a hazardous waste listing determination.

Categorical Regression. The categories of response used in the analysis correspond to the RfD and RfC derivation: no-observed-effect level (NOEL) = exposure level at which no effects were observed; NOAEL = exposure at which no adverse effects were observed; AEL = exposure at which mild to moderate adverse effects were observed; FEL = exposure at which severe (frank) effects were observed. Categorical regression procedures can be used to model the probabilities of these four categories occurring as a function of exposure level expressed as the logarithm of human equivalent dose or human equivalent concentration and duration of exposure expressed as a proportion of life span. For each of the compounds studied by this technique, a second data set is constructed by identifying and censoring "unreliable"

NOELs or NOAELs from each data set; these "censored" studies would not include measurement of sensitive toxicologic endpoints shown to be of interest, or were studies that tested clearly insensitive species.

The categorical regression model is described as follows: Given a categorical response variable where the K categories are ordered in some fashion, the outcomes can be expressed as numbers 1....K (e.g., Y=1(NOEL), Y=2(NOAEL), Y=3(AEL), Y=4(FEL)). Categorical regression can be used to express the relationship between category (Y) and an explanatory variable (X) and to estimate, at a specified value of X, the probability of the occurrence of a particular response category (Y=i). The final 3- and 4-category regression equations can be used to estimate the risk of a dose above the RfD or a concentration above the RfC.

7. Ecological Risk Assessment

The degree to which the constituents in a waste or any degradation product of the constituents bioaccumulates in ecosystems, and poses ecological risks when improperly treated, stored or disposed of, or otherwise managed are also considered in the Agency's listing determinations. See 40 CFR 261.11(a)(3). The measure of a chemicals tendency to bioconcentrate is expressed as a bioconcentration factor (BCF). The BCF is calculated by dividing the concentration of the chemical in exposed organism's tissues by the concentration of the chemical in the exposure medium. The values calculated are normalized to a 3% lipid content (typical to fish) for comparison. The higher the BCF, the greater the potential for bioconcentration to levels which would have ecological effects or pose risks to humans through consumption. Table 22 presents BCFs for selected carbamate products. A number of carbamate chemicals show significant potential to bioaccumulate if wastes containing these chemicals were to be mismanaged.

TABLE 22.—BIOCONCENTRATION FACTORS

CAS#	Common name	Estimated bioconcentration factor (BCF) 3% lipid
116–06–3	Aldicarb	3.03
1646–88–1	Aldicarb sulfone (Aldoxycarb)	1
337–71–1	Asulam	1.22
2008–41–5	Butylate	730
63–25–2	Carbaryl	30.5
1563–66–2	Carbofuran	35.8
101–21–3	Chloropropham	241
759–94–4	EPTC (Eptam)	171
2212–67–1	Molinate	88.2
114–26–1	Propoxur	7.02
122–42–9	Propham	45
28249–77–6	Thiobencarb	179
23564–05–8	Thiophanate-methyl	7.31
23031–17–5	Triallate	970

Screening methodology. The EPA performed a screening analysis for ecological risk based on waste stream description, waste management practice, and reasonable release scenarios. Chemical properties of the waste groups were another key component in determining ecological exposure routes. For example, given the fact that most of the chemical constituents had low BCFs, an estimate of exposure to chemicals that bioaccumulate up the food chain was not necessary for most constituents. Taking into account current waste management practices, reasonable release scenarios were established only for those waste streams going to landfills (Waste Groups 3, 6, 9, and Sludges). The remaining waste streams are managed in wastewater treatment plants (WWTP) and on-site treatment tanks, therefore significant releases to either aquatic or terrestrial ecosystems are not likely. Examples of relevant ecological exposure routes stemming from landfills include:

- Direct contact with contaminated soil and surface water that has been contaminated by overland runoff or by air particle deposition, or by groundwater that was contaminated as a result of landfill leachate;
- Direct ingestion of contaminated soil or surface water that has been contaminated by overland runoff, or by air particle deposition, or by groundwater that was contaminated as a result of landfill leachate.

Aquatic ecosystems. A comparison of waste stream chemical concentrations to their respective aquatic benchmarks, such as ambient water quality criteria and LC50s, was used as an initial screening to isolate chemicals of potential ecological concern. Those chemicals whose waste stream concentrations exceeded their aquatic benchmark, were then modeled through various pathways to estimate surface water (river) concentrations of the chemical. Only Ziram in waste group 9 appears at levels of concern in surface waters through the pathways modeled. Wastes solids from the production of the dithiocarbamate ziram were modeled to exceed the LC50 of trout by 11.9 fold for possible air to overland transport of solids to surface waters, and by 8.9 fold for overland transport to surface waters. The Agency concludes that solids from the production of similar dithiocarbamate products would present similar hazards, because of the acute aquatic toxicity exhibited by dithiocarbamates as a chemical class.

Terrestrial ecosystems. A comparison of waste group concentrations of chemicals to their respective terrestrial benchmarks was used as an initial screening to isolate the chemicals of potential concern. Those chemicals whose waste stream concentrations exceeded their terrestrial benchmark, were identified as constituents of concern. Modeling was conducted for each of these constituents through various pathways to estimate exposure concentrations. Since terrestrial organisms could be exposed through several media, chemical concentrations were estimated in soil, in fish, and in river water. A comparison was made of the estimated media concentrations of constituents to five types of terrestrial toxicity data: lowest observable adverse effect level (LOAEL) pertaining mostly

to rat species, oral LD_{50} for rat, dermal LD_{50} for rabbit, bird LD_{50} for a variety of avian species, and reproductive TD_{LO} (the toxic dose having the lowest effect) for rats.

Several constituents are present in the media at concentrations that exceed their respective terrestrial benchmark. Carbofuran in waste group 3 presents a potential hazard to birds, as soil concentrations are estimated to be above the avian LD_{50}. Bensulide, EPTC (eptam), vernolate, butylate and molinate in waste group 6 present potential hazards to mammals, as soil concentrations exceed both oral and dermal LD_{50}s and other criteria. In waste group 9, ziram, molybdenum, dibutylamine, dimethylamine, antimony and zinc are estimated to be present in soils and food chain pathways at levels that may present a hazard to both mammals and birds. Table 23 presents the results of this screening analysis for terrestrial toxicity.

EPA was unable to thoroughly assess exposures of particular animal species, their behavioral habits, and the complex relationships within their ecosystems, in order to quantify the terrestrial risk from carbamate waste.

TABLE 23.—TERRESTRIAL TOXICITY ASSESSMENT

Waste stream	Pathway type	Chemical	CAS	Concentration in media (mg/kg)	Ratio of media conc. to:				
					LOAEL	Oral LD50	Dermal LD50	Bird LD50	Reproduct. TDLo
Waste Group 3 ..	Soil	Carbofuran	1563662	soil—1.417E+0	1.10E–01	2.30E–01	1.30E–03	2.90E+00	2.00E–02
				veg—1.035E–1	8.00E–03	2.10E–02	1.20E–04	2.60E–01	1.50E–03
				fish—1.759E–4	1.40E–05	3.50E–05	2.00E–07	4.40E–04	2.50E–06
				river—1.256E–5 (mg/L)	1.00E–06	2.50E–06	1.40E–08	3.20E–05	1.80E–07
	Soil to Air to Soil.	Carbofuran	1563662	soil—1.417E+0	1.10E–01	2.30E–01	1.30E–03	2.90E+00	2.00E–02
				veg—1.035E–1	8.00E–03	2.10E–02	1.20E–04	2.60E–01	1.50E–03
				fish—8.329E–7	6.70E–08	1.70E–07	9.40E–10	2.10E–06	1.20E–08
				river—5.949E–8 (mg/L)	4.80E–09	1.20E–08	6.70E–11	1.50E–07	8.50E–10
Waste Group 6 ..	Soil	Bensulide	741582	soil—1.175E+3	na	4.30E+00	na	8.50E–01	na
				veg—1.796E+1	na	6.60E–02	na	1.30E–02	na
				fish—4.976E–2	na	1.80E–04	na	3.60E–05	na
				river—5.529E–4 (mg/L)	na	2.00E–06	na	4.00E–07	na
		EPTC	759944	soil—4.000E+4	4.00E+03	4.40E+01	2.70E+01	4.00E+02	4.00E+02
				veg—7.520E+2	7.50E+01	8.20E–01	5.20E–01	7.50E+00	7.50E+00
				fish—1.402E+0	1.40E–01	1.50E–03	9.60E–04	1.40E–02	1.40E–02
				river—2.089E–2 (mg/L)	2.10E–03	2.30E–05	1.40E–05	2.10E–04	2.10E–04
		Vernolate	1929777	soil—4.819E+1	9.60E+00	4.00E–02	na	na	na
				veg—4.753E–1	1.00E–01	4.00E–04	na	na	na
				fish—4.48E–03	9.00E–04	3.70E–06	na	na	na
				river—2.546E–5 (mg/L)	5.10E–06	2.10E–08	na	na	na
		Butylate	2008415	soil—5.054E+2	2.00E+01	1.70E–01	2.50E–01	na	5.10E+01
				veg—3.683E+0	1.50E–01	1.20E–03	1.80E–03	na	3.70E–01
				fish—7.340E–2	2.90E–03	2.40E–05	3.70E–05	na	7.30E–03
				river—2.549E–4 (mg/L)	1.00E–05	8.50E–08	1.30E–07	na	2.50E–05
		Molinate	2212671	soil—7.823E+3	1.96E+03	2.10E+01	2.20E+00	na	na
				veg—2.289E+2	5.70E+01	6.20E–01	6.50E–02	na	na
				fish—1.507E–1	3.80E–02	4.10E–04	4.30E–05	na	na
				river—4.319E–3 (mg/L)	1.10E–03	1.20E–05	1.20E–06	na	na
	Soil to Air to Soil.	Bensulide	741582	soil—1.175E+3	na	4.30E+00	na	8.50E–01	na
				veg—1.796E+1	na	6.60E–02	na	1.30E–02	na
				fish—7.227E–4	na	2.70E–06	na	5.20E–07	na
				river—8.03E–6 (mg/L)	na	3.00E–08	na	5.80E–09	na
		EPTC	759944	soil—4.000E+4	4.00E+03	4.40E+01	2.70E+01	4.00E+02	4.00E+02
				veg—7.520E+2	7.50E+01	8.20E–01	5.20E–01	7.50E+00	7.50E+00
				fish—2.036E–2	2.00E–03	2.20E–05	1.40E–05	2.00E–04	2.00E–04
				river—3.034E–4 (mg/L)	3.03E–05	3.30E–07	2.10E–07	3.00E–06	3.00E–06
		Vernolate	1929777	soil—4.819E+1	9.60E+00	4.00E–02	na	na	na
				veg—4.753E–1	1.00E–01	4.00E–04	na	na	na
				fish—6.508E–5	1.30E–05	5.40E–08	na	na	na
				river—3.697E–7 (mg/L)	7.40E–08	3.10E–10	na	na	na
		Butylate	2008415	soil—5.054E+2	2.00E+01	1.70E–01	2.50E–01	na	5.10E+01
				veg—3.683E+0	1.50E–01	1.20E–03	1.80E–03	na	3.70E–01
				fish—1.066E–3	4.30E–05	3.60E–07	5.30E–07	na	1.10E–04
				river—3.702E–6 (mg/L)	1.20E–07	1.00E–09	1.50E–09	na	3.70E–07
		Molinate	2212671	soil—7.823E+3	1.96E+03	2.10E+01	2.20E+00	na	na
				veg—2.289E+2	5.70E+01	6.20E–01	6.50E–02	na	na
				fish—2.189E–3	5.50E–04	5.90E–06	6.20E–07	na	na
				river—6.272E–5 (mg/L)	1.60E–05	1.70E–07	1.80E–08	na	na
		Dipropylamine	142847	soil—3.973E+3	na	8.60E+00	3.20E+00	na	na
				veg—5.823E+2	na	1.30E+00	4.70E–01	na	na

				fish—9.506E–5	na	2.10E–07	7.60E–08	na	na
				river—3.278E–5 (mg/L)	na	7.10E–08	2.60E–08	na	na
Waste Group 9 ..	Soil	Ziram	137304	soil—1.552E+5	na	5.81E+02	na	1.55E+03	6.21E+02
				veg—7.536E+3	na	2.80E+01	na	7.50E+01	3.00E+01
				fish—1.375E–1	na	5.10E–04	na	1.40E–03	5.50E–04
				river—7.766E–2 (mg/L)	na	2.90E–04	na	7.70E–04	3.10E–04
		Molybdenum	7439987	soil—8.410E+1	6.01E+02	na	na	na	1.40E+01
				veg—1.750E+0	1.30E+01	na	na	na	2.90E–01
				fish—3.881E–4	2.80E–03	na	na	na	6.40E–05
				river—3.881E–5 (mg/L)	2.80E–04	na	na	na	6.40E–06
		Antimony	7440360	soil—3.589E+4	1.03E+05	5.10E+00	na	na	na
				veg—1.198E+2	3.42E+02	1.70E–02	na	na	na
				fish—1.84E–2	5.30E–02	2.60E–06	na	na	na
				river—1.84E–2 (mg/L)	5.30E–02	2.60E–06	na	na	na
		Zinc	7440666	soil—5.107E+4	5.11E+04	na	na	na	na
				veg—3.159E+3	3.16E+03	na	na	na	na
				fish—4.782E+1	4.80E+01	na	na	na	na
				river—2.391E–2 (mg/L)	2.40E–02	na	na	na	na
	Soil to Air to Soil.	Dibutylamine	111922	soil—4.971E+2	na	2.60E+00	4.90E–01	na	na
				veg—1.737E+1	na	9.20E–02	1.70E–02	na	na
				fish—7.066E–5	na	3.70E–07	7.00E–08	na	na
				river—3.533E–6 (mg/L)	na	1.90E–08	3.50E–09	na	na
		Dimethylamine	124403	soil—7.179E+3	na	1.00E+01	na	na	na
				veg—2.079E+4	na	3.00E+01	na	na	na
				fish—8.269E–5	na	1.20E–07	na	na	na
				river—2.067E–4 (mg/L)	na	3.00E–07	na	na	na
		Ziram	137304	soil—1.552E+5	na	5.81E+02	na	1.55E+03	6.21E+02
				veg—7.536E+3	na	2.80E+01	na	7.50E+01	3.00E+01
				fish—1.996E–3	na	7.50E–06	na	2.00E–05	8.00E–06
				river—1.128E–3 (mg/L)	na	4.20E–06	na	1.10E–05	4.50E–06
Waste Group 9 ..	Soil to Air to Soil.	Molybdenum	7439987	soil—8.410E+1	6.01E+02	na	na	na	1.40E+01
				veg—1.750E+0	1.30E+01	na	na	na	2.90E–01
				fish—5.636E–6	4.00E–05	na	na	na	9.30E–07
				river—5.636E–7 (mg/L)	4.00E–06	na	na	na	9.30E–08
		Antimony	7440360	soil—3.589E+4	1.03E+05	5.10E+00	na	na	na
				veg—1.198E+2	3.42E+02	1.70E–02	na	na	na
				fish—2.673E–4	7.60E–04	3.80E–08	na	na	na
				river—2.673E–4 (mg/L)	7.60E–04	3.80E–08	na	na	na
		Zinc	7440666	soil—5.107E+4	5.11E+04	na	na	na	na
				veg—3.159E+3	3.16E+03	na	na	na	na
				fish—6.946E–1	6.90E–01	na	na	na	na
				river—3.473E–4 (mg/L)	3.50E–04	na	na	na	na

8. Summary of Basis for Listing For Additional K Listings and Other Considerations

EPA's decision to propose additional hazardous waste listings represents a determination by the Agency that six carbamate wastes (identified as K156 through K161) meet the criteria for listing as hazardous wastes presented in 40 CFR 261.11. Consequently, EPA is proposing to add these 6 wastes to the list of hazardous wastes from specific sources contained in 40 CFR 261.32. K156 through K161 wastes typically and frequently contain mobile and persistent hazardous constituents at levels such that concentrations of these constituents at human or environmental receptors may exceed one or more human or environmental health-based levels (HBLs) if the wastes are improperly managed. The high concentrations of hazardous constituents in these wastes, the mobility and persistence of the constituents of concern, and the estimated risks associated with those constituents satisfy the criteria set forth in 40 CFR 261.11 for listing a waste as hazardous and provide the basis for listing these wastes as hazardous. EPA is proposing that these wastes from carbamate production be listed as hazardous and subject to the requirements of 40 CFR parts 124, 262–266, 268, 270, and 271 since they are capable of posing a threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise handled.

As described in more detail below, these wastes frequently contain significant concentrations of product material and raw materials listed in Appendix VIII of 40 CFR part 261. These compounds may present a threat to human health and the environment if mismanaged due to their toxicity, mobility, and persistence. These constituents may be carcinogenic, mutagenic, and/or cause other chronic systemic effects if mismanaged. Some of these constituents are highly persistent and are mobile in the environment based on their physical properties and evidence from damage incidents studies collected by the Agency.

EPA in its risk analysis attempted to quantify the magnitude of the risk posed by plausible mismanagement of each of the waste groupings. EPA also notes that significant toxicological data gaps exist for all wastes, precluding a full accounting of the total risk from plausible waste mismanagement and from possible additive or synergistic interactions. The Agency was able to calculate risks for only those constituents of concern for which health-based numbers were available. All these wastes contain significant quantities or percent levels of chemicals which have limited toxicological data from which health-based numbers can not be developed.

The Agency requests comment on the basis for listing these wastes. EPA also requests comment on the data obtained for use in this listing determination, the methodology and the assumptions used in the risk assessment, and on the Agency's decision to list these waste streams. Specifically, the Agency requests comments on the assumptions used in the risk assessment which are highlighted in Section III.C.5 of this preamble. In particular, the Agency requests comments on the assumptions pertaining to characterization of the wastes, the distances from where the waste is managed to a receptor, the operating management practices for carbamate wastes disposed in a landfill, and the exposure frequencies and durations assumed at a receptor.

The Agency also requests comments on the option of not listing these waste streams. The Agency requests comments on the use of carbamate active ingredient damage information in assessing the potential damage from the mismanagement of carbamate waste streams and on the relevance of the historical record on management of these waste streams. In addition, EPA recognizes the volumes of some of the carbamate waste streams are relatively low and the Agency requests comment on whether and how they should be addressed in this listing. The Agency requests comments on whether existing or potential regulations under the Clean Air Act (CAA) or Clean Water Act (CWA), if promulgated, would reduce incremental risks from the mismanagement of carbamate wastes significantly to warrant not listing these wastes. Finally, the Agency also solicits comments on the methodology and assumptions used in the risk assessment. The Agency's risk assessment finds that the central tendency risk estimates are on the order of one in a million, with high end individual risk estimates falling in the range of 10^{-4} to 10^{-6}. EPA requests comments on the representativeness of these high-end scenarios and on the merits of alternative risk management strategies including decisions to list and not to list these waste streams.

The following provides a summary of the rationale for each of the proposed listings based on EPA's consideration of the criteria for listing set forth in 40 CFR 261.11. The supporting data and specific results of the risk assessment are presented elsewhere in this preamble. Results of the Agency's risk assessment estimating individual high-end and central tendency estimates and population estimates are presented in Section III of this preamble.

K156 Carbamate Organic Wastes. From the carbamate/carbamoyl oxime segment of the industry, the Agency is proposing to list organic wastes (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) as Hazardous Waste Number K156. K156 wastes frequently contain high concentrations of volatile solvents such as methylene chloride, methyl chloride, pyridine, and methyl ethyl ketone, and highly toxic products such as carbaryl and carbofuran. For K156 wastes, the primary pathway of concern was found to be air emissions and subsequent transport to nearby residents from the plausible mismanagement in open tanks. The high-end individual exposures were estimated to present cancer risks above a 10^{-6} level, as well as non-cancer effects based on exposures above reference concentrations. The Agency has also collected damage resource information showing the toxicity to wildlife of carbamate active ingredients such as those found in these wastes resulting from their misuse or mismanagement.

K157 Carbamate Wastewaters. K157 wastes frequently contain high concentrations of volatile solvents such as acetone, acetonitrile, acetophenone, aniline, benzene, chlorobenzene, chloroform, o-dichlorobenzene, hexane, methanol, methomyl, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, phenol, pyridine, toluene, triethylamine, and, xylene as well as toxic products including benomyl, carbaryl, carbendazim, carbofuran, and carbosulfan. The risk assessment primary pathway of concern was found to be air emissions from management in aerated tanks. In this scenario, the high-end individual exposure from volatile solvents were estimated to present inhalation cancer risks above a 10^{-6} level and non-cancer effects based on exposures above reference concentrations. The Agency has collected damage information showing toxicity to wildlife from carbamate active ingredients such as those found in these wastes resulting from the misuse or mismanagement of these chemicals.

In the case of wastewaters proposed for listing as K157, air emissions from current management practices were found to present substantive high-end individual cancer risks, as well as non-cancer effects. In order to control and reduce these emissions, a number of

possible options were considered by the Agency. The Agency believes that industry should implement cost-effective source reduction efforts to reduce the volume and toxicity of the wastes that pose these risks through chemical substitution, process changes, or other measures that could result in the greater recovery and reuse of volatile chemicals in the original production process to reduce the risks. Where process changes are not cost-effective, the Agency believes cost-effective controls should be installed to capture these emissions for reuse or off-site recycling.

Air emissions from hazardous waste treatment, storage, and disposal facilities (TSDFs) can be addressed by regulations under RCRA 3004(n). Currently, standards are in place for process vents and equipment leaks (subparts AA and BB of 40 CFR part 264 and part 265). Regulations to control air emissions from tanks, surface impoundments, containers, and certain miscellaneous units were proposed July 22, 1991 (56 FR 33490). This proposal would add part CC air emission requirements to 40 CFR part 264 and part 265. However, under 40 CFR 264.1(g)(6) and 265.1(c)(10), wastewater treatment units which employ tanks and are subject to regulation under either section 402 or 307(b) of the Clean Water Act are not subject to either the part 264 or 265 standards, and, as such, would not be subject to the CC regulations when promulgated as a final rule. As a result, listing these wastes as hazardous without also changing existing exemptions from waste management rules can not mitigate the risks found, since the current exemptions would also prevent application of part CC air emission standards, when finalized, to these units. As EPA stated when it promulgated the limited permitting exemption, these exemptions "were intended to reduce the regulatory burden on a class of facilities which pose less of a risk to human health and the environment than other types of hazardous waste management facilities" (47 FR 4706). Removal of these exemptions as a means to control the air emissions from this one industry group would defeat this purpose, and necessitate the resource-intensive permitting of thousands of low risk facilities. The Agency is not at this time proposing to remove or amend 40 CFR 264.1(g)(6) and 264.1(c)(10). However, the Agency is exploring additional options to control air emissions from such facilities.

As an alternative to listing this wastewater stream as hazardous and subjecting them to the management control of the air emission under RCRA 3004(n) authority, the Agency also considered the availability of other authorities that specifically direct EPA to control air emissions. The primary statute providing such authority is the Clean Air Act (42 U.S.C. 7401 et seq., as amended by the Clean Air Act of 1990, Public Law 101–549, Nov. 15, 1990). Under the Clean Air Act (CAA), the Agency has proposed a National Emission Standard for Hazardous Air Pollutants (NESHAP) for producers of hazardous organic air pollutants (57 FR 62608). The proposed NESHAP, if promulgated as a Final Rule, would control wastewaters from the production of one of the carbamate products (carbaryl), provided the total hazardous air pollutant (HAP) concentration is 10,000 parts per million by weight, or a total average concentration greater than or equal to 1,000 parts per million by weight and the average flow rate is greater than or equal to 10 liters per minute, but does not impact other carbamate product lines. With the passage of the CAA, the Agency has embarked on a multiyear plan for implementation through the year 2000 (57 FR 44147, July 16, 1992). As explained in the July 16, 1992 notice, the Agency is also developing additional NESHAPs to cover a number of other source categories, but these actions would not fully control the risks associated with the particular wastewaters of concern in the carbamate industry segment. The Agency has also developed draft control technique guidlines (CTGs) under the Clean Air Act (see document No. EPA 453/D–93–056) which may address some air risks at facilities in non-attainment areas. The Agency also plans to develop alternative control techniques (ACTs) which are not mandatory. Because of the limited applicability of the CTGs and ACTs, they will not address all air risks from carbamate facilities.

In order to provide industry with flexibility to allow it to accomplish the Agency's source reduction goals, the Agency is proposing a regulatory strategy which allows for a concentration-based exemption from the listing. For wastewaters from the production of carbamate and carbamoyl oxime chemicals (proposed as hazardous waste code K157), a hazardous waste listing coupled with a concentration-based listing exemption is appropriate to define when the K157 wastewater in tanks ceases to pose an unacceptable risk to human health or the environment. Using models to calculate the atmospheric concentrations of chemicals of concern, the Agency found that for these wastewaters a total concentration of 5 parts per million by weight (ppmwt) would be protective for wastewater containing formaldehyde, methyl chloride, methylene chloride, and triethylamine. For these constituents of concern, the 5 ppmwt level, while protective of air emission risks, would be above the 40 CFR part 268 best demonstrated available treatment (BDAT) level for these constituents in other hazardous wastewaters and current delisting criteria. These treatment standards assume that wastes have been subjected to final treatment prior to disposal. Assuming further wastewater treatment as necessary before discharge, under the "plausible mismanagement" scenario of treatment in open tanks for K157 (see Section III.C.5), the Agency views this level as protective. In addition, EPA notes that the 40 CFR Part 268 land disposal restrictions's would not apply to wastes managed in tanks except to the extent the wastes were also managed in land-based units such as surface impoundments. Therefore, the Agency is proposing a concentration-based exemption to the listing description of these wastewaters.

The Agency is proposing to list as Hazardous Waste Number K157 the "group 2" wastewaters as follows:

K157—Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes.

Under § 261.3(a)(2)(iv), a new exemption to the definition of hazardous wastes would be created for these wastewaters. This proposed new exemption would read:

§ 261.3(a)(2)(iv) * * *

(F) One or more of the following wastes listed in § 261.32— wastewaters from the production of carbamates and carbamoyl oximes (EPA Hazardous Waste No. K157)— provided that the maximum weekly usage of formaldehyde, methyl chloride, methylene chloride, and triethylamine (including all amounts that cannot be demonstrated to be reacted in the process or is recovered, i.e., what is discharged or volatilized) divided by the average weekly flow of process wastewater prior to any dilutions into the headworks of the facility's wastewater treatment system does not exceed a total of 5 parts per million by weight.

Under this exemption, wastes which are calculated to contain less than a total concentration of 5 ppmwt for the sum of the four constituents of concern would not be hazardous wastes, and any sludges generated from further biological treatment would not be derived from hazardous wastes,

assuming wastewaters are <5 ppmwt at the point of generation.

The Agency does not intend to determine compliance with this provision by requiring that generators actually monitor the concentration of the constituents of concern in untreated wastewater, but proposes to use the same strategy used in other exemptions for wastewaters discharged into the headworks of a wastewater treatment system found at 40 CFR 261.3(a)(2)(4) (46 FR 56582, November 17, 1981). A generator must be able to demonstrate that the total amount of all constituents of concern that is not converted to product or recovered (i.e., what is discharged or volatilized) during the week divided by the average weekly flow of the process unit discharge to into the headworks of the final wastewater treatment step not exceed the proposed standards.

This demonstration can be made through an audit of various records already maintained at most facilities, including invoices showing material purchases, lists including to whom and how much inventory was distributed and other, similar, operating records. A facility can exclude that portion of the constituents of concern not disposed to wastewaters. No portion of the material of concern which is volatilized may be excluded from the calculation. The Agency requests comment on whether or not specific record keeping requirements should be promulgated. Under current regulations (40 CFR 262.11 and 268.7) generators are required to determine whether their wastes are hazardous. Facilities claiming the exemption would have to be able to demonstrate that they meet the exemption. Such information would be intended to verify compliance with this concentration standard. An EPA inspector would look to this information to verify the assessment made by the generator, and may employ direct analytical testing as further verification. Should either measurement indicate a total concentration greater than 5 ppmwt for the sum of the concentrations of the four chemicals of concern, then the wastes shall be subject to regulation as K157 hazardous waste. In this manner, the Agency seeks to discourage and prevent air stripping or other technologies which would merely continue to volatilize these hazardous air pollutants of concern. The Agency requests comment on using this regulatory strategy to achieve risk reduction.

The Agency is also proposing to specifically exempt biological treatment sludges from the treatment of wastewaters from the production of carbamates and carbamoyl oximes from the definition of hazardous waste. Under § 263.3(c)(2)(ii), a new exemption to the definition of hazardous wastes would be created for sludges from the biological treatment of these wastewaters. This proposed new exemption would read:

§ 261.3(c)(2)(ii) * * *

(D) Biological treatment sludge from the treatment of one of the following wastes listed in § 261.32—wastewaters from the production of carbamates and carbamoyl oximes (EPA Hazardous Waste No. K157).

Without exemption, a large volume of previously disposed wastes and sludge currently collecting within the various treatment systems would require management as derived from newly identified hazardous waste. However, in the case of the biological sludges from the treatment of carbamate and carbamoyl oxime wastewaters, the Agency could only identify risks resulting from the hazardous volatile air pollutants present in the wastewaters being treated. Neither these air pollutants nor other hazardous substances were found to be accumulating in the biological treatment sludges studied by the Agency. This leads the Agency to believe these sludges do not meet the definition of hazardous waste. Therefore, the Agency is proposing to exempt these sludges derived from the proposed K157 wastes from the definition of hazardous wastes, provided the wastes are not otherwise characteristically hazardous. EPA believes that this exemption is particularly appropriate because of the small number of facilities in this industry and the Agency's through investigation of carbamate wastes, as described elsewhere in this preamble.

K158 Carbamate Baghouse Dust and Filter/Separation Solids. K158 wastes frequently contain percent levels of such products as carbofuran, carbosulfan, benomyl, and carbendazim as well as such solvents as methylene chloride, chloroform, phenol, and xylene. These materials are known to be mobile in soils and may pose risks above a 10^{-6} level by direct exposure or through groundwater transport when landfilled. The product chemicals in K158 wastes are acutely toxic to humans, birds, and fish. The Agency believes that, if mismanaged, carbofuran wastes will present significant risks through a soil pathway for wildlife. The Agency recognizes that there is 549 metric tons of K158 waste generated annually. The Agency has collected damage information showing toxicity to wildlife from carbamate active ingredients such as those found in these wastes resulting from their misuse or mismanagement.

K159 Thiocarbamate Organic Wastes. The Agency is proposing to list organics from the treatment of thiocarbamate wastes as Hazardous Waste Number K159. These wastes frequently contain benzene, and toxic thiocarbamate product materials, such as eptam, molinate, and butylate, at percent levels.

EPA's risk assessment estimated high-end individual cancer risk above a 10^{-6} level for inhalation of benzene, assuming plausible mismanagement in open tanks. In addition, because EPA currently lacks inhalation reference levels for the other constituents (eptam, molinate, and butylate), EPA was unable to evaluate potential risks from volatilization of these other constituents. The Agency has damage case information for these wastes involving groundwater contamination.

K160 Thiocarbamate Solids. The Agency is proposing to list solids (including spent carbon, filter wastes, separation solids and spent catalysts) from the production of thiocarbamates and solids from the treatment of thiocarbamate wastes as Hazardous Waste Number K160. These wastes contain significant concentrations of benzene and percent levels of thiocarbamate product materials, such as eptam, molinate, and butylate. Also, similar to K159 wastes, the Agency was unable to quantify risks from volatilization of eptam, molinate, and butylate. Assuming plausible mismanagement in an unlined landfill, EPA's risk assessment showed high-end individual cancer risks above a 10^{-6} level and non-cancer effects for the ground water, air, and soil ingestion pathways.

In addition to the human health risk assessment results, EPA has records of mismanagement contributing to ground water contamination. These damage cases are discussed in Section III.C.4 of this preamble. Furthermore, the Agency calculated numerous significant terrestrial ecosystem risks, which are presented in Table 23 of this preamble. There is approximately 665 metric tons of K160 waste generated annually.

K161 Dithiocarbamate Solid Wastes. From the dithiocarbamate segment of the industry the Agency is proposing to list purification solids (including filtration, evaporation, and centrifugation solids), and baghouse dust and floor sweepings as Hazardous Waste Number K161. K161 wastes frequently contain carbon disulfide, heavy metals such as lead, nickel, arsenic, selenium, antimony and cadmium, and are comprised largely of reactive dithiocarbamate product

materials such as metam-sodium and ziram, which are highly toxic to aquatic organisms. Because these products readily react in the environment to form other gases or vapors, such as carbon disulfide, hydrogen sulfide, methylisothiocyanate, and amines, which can oxidize to carcinogenic nitrosoamines, the EPA is proposing to require management of these dithiocarbamate wastes as reactive and toxic hazardous wastes. High-end individual cancer risks above a 10^{-6} level and non-cancer effects for wastes disposed in an off-site landfill were estimated, and significant adverse aquatic or terrestrial ecological effects were predicted from airborne transport. The Agency has also collected damage resource information showing the toxicity to wildlife if the wastes containing dithiocarbamate product were mismanaged or the product was misused.

9. Summary Basis for a No-Listing Decision on Wastewaters, and Certain Wastewater Treatment Residuals

The Agency's decision to propose a "no list" determination for a particular waste or waste stream represents a weight of evidence finding that additional regulation is not required to protect human health and the environment based on currently available information. This in no way implies that there is no potential hazard, or that significant environmental damage could not occur from gross mismanagement of the wastes. However, based on a comprehensive survey of the industry, EPA believes that no significant threat exists from normal or plausible mismanagement.

Wastewaters of groups 5, 7, and 8 are generated throughout the carbamate manufacturing processes. Typically, a facility's wastewaters include reactor and tank washwaters, scrubber waters, condenser waters, process decantates, mother liquors, rinsewaters, equipment washes, and rainwater runoff. Several facilities treat wastewaters on site before discharge to a publicly owned treatment works (POTW) or a privately owned treatment works (PrOTW) or through an on-site wastewater treatment plant and then discharge under a National Pollutant Discharge Elimination System (NPDES) permit. Some wastewaters are incinerated and many are recycled back to the process. The Agency has analyzed several of these wastewaters and found that in some cases they may also contain constituents of concern at significant levels.

Most wastewaters are collected and treated in an on-site wastewater treatment plant. As a result, the effluent from the wastewater treatment plant is subject to either the effluent guidelines and pretreatment standards promulgated for the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) industries (52 FR 42522, November 5, 1987) or the Pesticide Chemicals Manufacturing Effluent Limitations, Guidelines, Pretreatment Standards, and New Source Performance Standards. These pesticide chemical manufacturing effluent limitations, guidelines and standards have been promulgated for a limited number of carbamate pesticides (58 FR 50638, September 28, 1993).

In response to the effluent guidelines, a number of facilities may install steam stripping or other technologies to aid in compliance with the new effluent guidelines. The result of such action could be a reduction in the volatile materials currently reaching the wastewater treatment systems, if the stripper heads are recycled.

In addition to the wastewaters proposed as hazardous waste number K157, the Agency also considered the following possible listings for wastewaters:

Group 5—Wastewaters from the production of thiocarbamates and treatment of wastes from thiocarbamate production.

Group 7—Process Wastewater (including supernates, filtrates, and washwaters) from the production of dithiocarbamates.

Group 8—Reactor vent scrubber water from the production of dithiocarbamates.

A large proportion of these streams are treated on site in tanks before discharge under the Clean Water Act (CWA). Current risks were modeled for air emissions from the wastewater treatment units (i.e., tanks). Although the gross mismanagement of these wastewaters in unlined surface impoundments could result in significant environmental harm, management in unlined surface impoundments currently exists only for wastewaters which have been treated to reduce toxicity. Therefore, the Agency determined that for these wastewaters "plausible mismanagement" would be continued management in the open tanks of the existing treatment systems. The Agency is proposing not to list wastewaters from groups 5, 7, and 8, which were modeled and found to not present significant risks from current management practices.

The Agency requests comment on its decisions not to list these wastes, and in particular on its selection of "plausible mismanagement" of the wastewaters to be the current management in tanks. Had the Agency selected "plausible mismanagement" to be "gross mismanagement" such as management in unlined surface impoundments or discharge without treatment, then the significant intrinsic hazard of these wastes would have likely resulted in significantly greater estimates of potential risk. In this case, the Agency surveyed the entire industry and identified all current management practices to be treatment in tanks, except in the last stages of wastewater treatment. The Agency can foresee no reason for these facilities to abandon their current treatment works, and therefore, it is reasonable for the Agency to conclude, for these wastes in this industry, that current practices constitute "plausible mismanagement."

The treatment of wastewaters generates sludges from aqueous separation, neutralization, and biological treatment. The Agency has found that organic/aqueous separator sludges are concentrated organic residuals containing significant levels of the constituents of concern. In contrast, most of the constituents of concern were not detected in wastewater neutralization and biological sludges from the production of carbamate and carbamoyl oxime products. Constituents present in these wastes, when detected, were typically present at levels below 100 times the HBI. Thus, the Agency is proposing to not exempt biological wastewater treatment sludges derived from the production of carbamate and carbamoyl oxime products from the definition of hazardous wastes and to provide an exemption for the source wastewaters provided hazardous air pollutants have been removed.

In addition, a significant volume of spent carbons are generated from the production of carbamate and carbamoyl oxime products. These spent carbons are currently regulated as D022 hazardous wastes due to the leachable concentration of chloroform absorbed on the spent carbon. During its data collection effort in support of this proposal, the Agency characterized the spent carbons and found chloroform to be the driving contaminant of concern. In the Agency's opinion, existing hazardous waste regulations are adequate for these spent carbons, and therefore proposes to narrow the scope of the waste grouping of solids from the production of carbamates and carbamoyl oximes to focus on bag house dusts and filter/separation solids which are currently not regulated.

Similarly, for organic wastes from the production of dithiocarbamates, the Agency found from its § 3007 Carbamate Industry Survey that all wastes in the grouping were already regulated as either hazardous waste F003 or F005. The Agency feels that these wastes are adequately regulated by existing

regulations, and is proposing not to separately list these wastes as hazardous to avoid redundant regulation.

10. Summary of Basis for Listing For Additional P & U Listings

The 23 materials listed in Table 5 meet the criteria for listing as acute hazardous wastes presented in 40 CFR 261.11(a)(2). They are acutely hazardous because they have been found to be fatal to humans in low doses or in the absence of data on human toxicity, have been shown in animal studies to have an oral (rat) LD50 of less than 50 milligrams per kilogram, a dermal rabbit LD50 of less than 200 milligrams per kilogram, an inhalation (rat) LC50 of less than 2 mg/L, or are otherwise capable of causing or significantly contributing to serious illness. Table 24 presents these commercial chemical products proposed for listing as acute hazardous waste, the oral LD50 (rat), inhalation LC50 (rat), and the dermal LD50 (rabbit). As shown in this table, each of these chemicals meets at least one of these criteria. Consequently, based in part on these aquatic and acute mammalian toxicity data, EPA is proposing to add these 23 materials to the list of hazardous wastes in 40 CFR 261.33(e).

Chemical substances which pose toxic threats to human health or the environment are listed in 40 CFR 261.33(f). For the purposes of identifying compounds to be included on this list, the Agency considers principally the nature of the toxicity (see 40 CFR 261.11(a)(3)(i)) and its concentration (see 40 CFR 261.11(a)(3)(ii)). Concentration of the material will be high because commercial chemicals will consist in a large degree the toxic compound or contain the compound as the sole active ingredient. Table 25 presents aquatic and acute mammalian toxicity data, including the oral LD50 (rat), inhalation LC50 (rat), and dermal LD50 (rabbit), used to support the proposed hazardous waste listing of these toxic commercial chemical products.

In compiling the basic toxicological information contained in Table 25, the Agency found that for many carbamate products or captive intermediates, there was little or no toxicological studies recorded in either the available literature, the Agency's records, or on current Material Safety Data Sheets. To facilitate the assessment of toxicological properties of the chemicals of concern in the production of carbamate chemicals, these chemicals with limited toxicity data were divided into structure-toxicity groups. These groups are:

a. esterase (cholinesterase) inhibiting,
b. other non-cancer toxicity,
c. potentially carcinogenic, and
d. toxic metal (metallocarbamates).

Structure-toxicity surrogates were then selected for each group and their toxicity ascribed to the group members, for which human data are lacking and animal data are inadequate. For most of the constituents, some data on the toxicity of the chemical itself or of its metabolites were available. This information was used to assign the chemicals to one of the four toxicity groups. The assignment of groups was used to develop surrogate health benchmarks for use in the analysis. Although the data were adequate for identifying the toxicity of a chemical, there is considerable uncertainty in assigning surrogate health benchmarks for these chemicals. Further discussion of this approach can be found in "Integrative Evaluation of the Toxicity of Data-Poor Constituents of the Carbamate Waste Listing," available in the docket supporting this proposed rule. See **"ADDRESSES"** section. The Agency believes that this approach is especially valid for such structurally similar chemicals as carbamates. The Agency requests comment on this approach, and any additional toxicity information.

Table 25 also includes four generic listings; one each for each specific chemical group of carbamate products. The Agency feels that these generic descriptions are warranted to help emergency first responders identify the potential hazards of carbamate, carbamoyl oxime, thiocarbamate, and dithiocarbamate products. These descriptions are intended to be analogous to the current Department of Transportation labeling requirements for carbamate pesticides and dithiocarbamate pesticides to speed hazard identification in the advent of future transportation accidents.

The Agency feels such generic product listings are especially appropriate for such structurally similar chemicals as carbamate, carbamoyl oximes, thiocarbamates and dithiocarbamates. As a group this chemicals exhibit significant toxicity to a number of organisms, which has been the basis for the registration and use of a number of these substances as pesticide active ingredients.

As a chemical class dithiocarbamates are highly reactive materials, which are normally utilized as a more stable metal salt. However, even these salts are subject to decomposition to toxic amines, alkylisothiocyanates, and carbon disulfide, and to the oxidation of the amines to form carcinogenic nitrosoamines. The Agency, therefore, believes that the entire class of dithiocarbamate discarded products and spill residues will typically exhibit the characteristic of reactivity and is subject to existing regulation as D003 Characteristic Hazardous Wastes. Because no facility reported current management of these dithiocarbamate products waste as reactive hazardous wastes, the Agency is proposing to separately designate these dithiocarbamate wastes as hazardous wastes.

TABLE 24.—TOXICITY DATA FOR PROPOSED ACUTELY HAZARDOUS COMMERCIAL CHEMICAL PRODUCTS

Proposed waste code	Acutely hazardous wastes CAS name (common name in parentheses)	CAS No.	Oral LD50 (rat) mg/kg	Inh. LC50 (rat) mg/L 4 hr.	Dermal LD50 rabbit mg/kg	Aquatic LC50 mg/L 4 day unless noted
P185	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)carbonyl]oxime (Tirpate).	26419–73–8	1	.....	350	
P186	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O-[(methylamino)carbonyl]oxime (Thiofanox).	39196–18–4	8.5	0.070	39	
P187	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb).	22781–23–3	64–119 female rat, 72–156 male rat.	0.55 2.2/1hr	566 rat	0.47–1.67 (BG), 1.2–1.5 (Trout), 5.55 (RC).

TABLE 24.—TOXICITY DATA FOR PROPOSED ACUTELY HAZARDOUS COMMERCIAL CHEMICAL PRODUCTS—Continued

Proposed waste code	Acutely hazardous wastes CAS name (common name in parentheses)	CAS No.	Oral LD50 (rat) mg/kg	Inh. LC50 (rat) mg/L 4 hr.	Dermal LD50 rabbit mg/kg	Aquatic LC50 mg/L 4 day unless noted
P127	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate (Carbofuran).	1563–66–2	5	0.017–0.047	885	0.165 (BG), 0.380 (RT)a, 0.872 (FM)a.
P188	Benzoic acid, 2-hydroxy, compd. with (3as-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate).	57–64–7	2.5 (mouse)			
P189	Carbamic acid, [(dibutylamino)thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan).	55285–14–8	51	1.53/1hr	>2,000	
P190	Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb).	1129–41–5	268	0.475		
P191	Carbamic acid, dimethyl-, 1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan).	644–64–4	25		2,000	0.012/0.5 hr (DM), 0.074/2d (TC).
P192	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester (Isolan).	119–38–0	10.8			10.7 (RT).
P193	Carbamic acid, [1,2- phenylenebis (imino carbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl).	23564–05–8	6,640	1.7	>10,000	11.4/3d (RT), 16/2d (DM).
P194	Ethanimidothioc acid, 2-(dimethylamino)-N- [[(methylamino)carbonyl] oxy]-2-oxo-, methyl ester (Oxamyl).	23135–22–0	2.5 female	0.064 male	740	8.3 (FM).
P195	Ethanimidothioic acid, N,N'-[thiobis [(methylimino)carbonyloxy]]bis-, dimethyl ester (Thiodicarb).	59669–26–0	66	0.52	6,310	1.21 (BG), 2.55 (RT).
P196	Manganese, bis(dimethyl carbamodithioato-S,S')-, (Manganese dimethyldithio carbamate).	15339–36–3	32			
P197	Methanimidamide, N,N-dimethyl -N'-[3-methyl- 4-[[(methyl amino)carbonyl] oxy]phenyl]- (Formparanate).	17702–57–7	7.2			
P198	Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino) carbonyl]oxy] phenyl]-, monohydro chloride (Formetanate hydrochloride).	23422–53–9	20		10,200	
P128	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester) (Mexacarbate).	315–18–4	14		>500	10.4 (BG), 12 (RT)a, 23.7 (FM), 15.8 (CT)a.
P199	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate (Methiocarb).	2032–65–7	20		>2,000 350 (rat).	0.8 (RT), 0.21 (BG).
P200	Phenol, 2-(1-methylethoxy)-, methylcarbamate (Propoxur).	114–26–1	70	1.44/1hr	800 (Rat)	1.47 (DM), 8.2 (RT)a, 25 (FM)a, 4.8 (BG)a.
P201	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb).	2631–37–0	35		>1,000	28 (TD).
P202	Phenol, 3-(1-methylethyl), methyl carbamate (Hercules AC–5727).	64–00–6	16		40	0.180 (RT).
P203	Propanal, 2-methyl-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime (Aldicarb sulfone).	1646–88–4	20	0.14	200	1.017/2d (DL).
P204	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-(Physostigmine).	57–47–6	3 (mouse)			
P205	Zinc, bis(dimethyl carbamodithioato-S,S')-, (Ziram).	137–30–4	267	0.081	>2,000	0.002/60d (RT), 0.17/4d (FM) [1].

BG: Blue Gill
DS: Daggerblade Shrimp
RT: Rainbow Trout
WM: White Mullet
b: Interperitoneal
CT: Cutthroat Trout
FM: Fathead Minnow
SC: Scud
a: Active Ingredient

DP: Daphnia Pulex
DL: Daphnia Laevis
HF: Harlequinfish
TC: Tooth Carp
DM: Daphnia Magna
RC: Red Crayfish
TD: Toad
[1] Recalculation involved

TABLE 25.—TOXICITY INFORMATION FOR PROPOSED TOXIC COMMERCIAL CHEMICAL PRODUCTS

Proposed waste code	Toxic hazardous wastes IUPAC name (common name in parentheses)	CAS No.	Oral LD50 (rat) mg/kg	Inh. LC50 (rat) mg/L 4 hr.	Dermal LC50 rabbit mg/kg	Aquatic LC50 mg/L 4 day unless noted
U360	Carbamates N.O.S					
U361	Carbamoyl Oximes N.O.S					
U362	Thiocarbamates N.O.S					
U363	Dithiocarbamate acids, salts, and/or esters, N.O.S. (This listing includes mixtures of one or more dithiocarbamic acid, salt, or ester.).	.....	.....	.....	.....	
U279	1-Naphthalenol, methylcarbamate (Carbaryl).	63–25–2	230	>3.4	2,000	3.28 (DM), 6.7 (BG), 2.1 (RT), 13.4 (FM).
U364	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol).	22961–82–6	4,640	.....	.....	10 (RT), 25/2d (DM).
U365	1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ester (Molinate).	2212–67–1	369	>0.2	3,536	0.32 (BG)a, 14.0 (RT).
U366	2H-1,3,5-thiadiazine-2-thione, tetrahydro-3,5-dimethyl-(Dazomet).	533–74–4	320	8.4	7,000	0.28/2d [1] (HF).
U367	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-(Carbofuran phenol).	1563–38–8	.....	.....	.....	16/2d (DP).
U368	Antimony tris (dipentylcarbamodithioato-S,S')-(Antimony trisdipentyldithiocarbamate).	15890–25–2	16,400	.....	16,000	
U369	Antimony, tris[bis(2-ethylhexyl)carbamodithioato-S,S']-, (Antimony tris(2-ethylhexyl)dithiocarbamate).	15991–76–1	16,400	.....	16,000	
U370	Bismuth, tris(dimethylcarbamodithioato-S,S+-, (Methyl bismate).	21260–46–8	>3,000			
U371	Carbamic acid, [(dimethylamino)iminomethyl)] methyl, ethyl ester monohydrochloride (Hexazinone intermediate).	65086–85–3	>11,000			
U280	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban).	101–27–9	527	27.4	23,000	1.16/2d (HF)[1].
U372	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim).	10605–21–7	6,400	.....	>10,000	>3.20 (BG), 0.48 (RT), 0.55/2d (DM).
U373	Carbamic acid, phenyl-, 1-methylethyl ester (Propham).	122–42–9	1,000	.....	>5,000 (Rat).	38 (RT)a, 29 (BG)a, 10 (SC).
U374	Carbamic acid, [[3-[(dimethylamino)carbonyl]-2-pyridinyl]sulfonyl]-phenyl ester (U9069).	112006–94–7	>11,000	>5.7		
U271	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-, methyl ester (Benomyl).	17804–35–2	10,000	>2	>10,000	1.3 (BG), 0.29 (RT), 2.05 (FM)a.
U375	Carbamic acid, butyl-, 3-iodo-2-propynyl ester (Troysan Polyphase).	55406–53–6	372	.....	>2,000	1.1 (RT).
U376	Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid (Selenium dimethyldithiocarbamate).	144–34–3	104 (mouse)			
U377	Carbamodithioic acid, methyl,-monopotassium salt (Potassium n-methyldithiocarbamate).	137–41–7	630	.....	.....	0.012/2d (DM), 0.08 (RT).
U378	Carbamodithioic acid, (hydroxymethyl)methyl-, monopotassium salt (Busan 40).	51026–28–9	590			

TABLE 25.—TOXICITY INFORMATION FOR PROPOSED TOXIC COMMERCIAL CHEMICAL PRODUCTS—Continued

Proposed waste code	Toxic hazardous wastes IUPAC name (common name in parentheses)	CAS No.	Oral LD50 (rat) mg/kg	Inh. LC50 (rat) mg/L 4 hr.	Dermal LC50 rabbit mg/kg	Aquatic LC50 mg/L 4 day unless noted
U277	Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester (Sulfallate).	95–06–7	850		2,200	
U379	Carbamodithioic acid, dibutyl, sodium salt (Sodium dibutyldithiocarbamate).	136–30–1	670			
U380	Carbamodithioic acid, dibutyl-, methylene ester (Vanlube 7723).	10254–57–6	>16,000		>2,000	
U381	Carbamodithioic acid, diethyl-, sodium salt (Sodium diethyldithiocarbamate).	148–18–5	1,500		>1,000 (Rat).	0.91/2d (DM).
U382	Carbamodithioic acid, dimethyl-, sodium salt (Dibam).	128–04–1	1,000			0.0064/60d (RT), 0.67/2d (DM).
U383	Carbamodithioic acid, dimethyl, potassium salt (Potassium dimethyl dithiocarbamate) (Busan 85).	128–03–0				0.049 (DS).
U384	Carbamodithioic acid, methyl-, monosodium salt (Metam Sodium).	137–42–8	450		800	0.33/1.08d (DM)[1].
U385	Carbamothioic acid, dipropyl-,S-propyl ester (Vernolate).	1929–77–7	1,200		>9,000	2.5 (BG)a, 4.3 (RT)a, 1.8 (SC).
U386	Carbamothioic acid, cyclohexylethyl-, S-ethyl ester (Cycloate).	1134–23–2	1,678		3,000	2.6 (SC)[1].
U387	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester (Prosulfocarb).	52888–80–9	1,820	>4.7	>2,000	
U388	Carbamothioic acid, (1,2-dimethylpropyl) ethyl-, S-(phenylmethyl) ester (Esprocarb).	85785–20–2	>2,000		>2,000 (rat)	
U389	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester (Triallate).	2303–17–5				6.0/2d (HF)[1].
U390	Carbamothioic acid, dipropyl-, S-ethyl ester (Eptam).	759–94–4	916	4.3	1,460	17 (CT)a.
U391	Carbamothioic acid, butylethyl-, S-propyl ester (Pebulate).	1114–71–2	921		4,640	6.25/2d (WM)[1].
U392	Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester (Butylate).	2008–41–5	4,000		2,000–5,000.	5.5 (BG), 3.6 (RT), 11 (SC).
U393	Copper, bis(dimethylcarbamodithioato-S,S')-, (Copper dimethyldithiocarbamate).	137–29–1				0.15 (FM)[1], 0.32 (BG)[1].
U394	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester (A2213).	30558–43–1	>7,000			
U395	Ethanol, 2,2'-oxybis-, dicarbamate (Reactacrease 4–DEG).	5952–26–1	8,300 (mouse) ..			5.0/2d (RT), 5.0/2d (BG).
U396	Iron, tris(dimethylcarbamodithioato-S,S')-, (Ferbam).	14484–64–1	1,130			.0029/60d (RT), 2.2 (FM), 0.9/2d (DM).
U397	Lead, bis(dipentylcarbamodithioato-S,S')-.	36501–84–5	>10		>4.64	
U398	Molybdenum, bis(dibutylcarbamothioato)-di-.mu.-oxodioxodi-, sulfurized.	68412–26–0	>10,000	>34.4	>10,000	
U399	Nickel, bis(dibutylcarbamodithioato-S,S')- (Nickel dibutyldithiocarbamate).	13927–77–0	17,000			
U400	Piperidine, 1,1'-(tetrathiodicarbonothioyl)-bis-(Sulfads).	120–54–7	200 (mouse) b			
U401	Bis(dimethylthiocarbamoyl) sulfide (Tetramethylthiuram monosulfide).	97–74–5				0.038/60d (RT), 2.9/2d (DM).
U402	Thioperoxydicarbonic diamide, tetrabutyl (Butyl Tuads).	1634–02–2	2,350 (mouse) ..			>0.56/2d (DM).
U403	Thioperoxydicarbonic diamide, tetraethyl (Disulfiram).	97–77–8	8,600			0.009/60d (RT), 0.12/2d (DM).
U404	Ethanamine, N,N-diethyl-(Triethylamine).	121–44–8	460	6/2hr (mouse) ...	570	137/60d (RT).
U405	Zinc, bis[bis(phenyl methyl)carbamodi thioato-S,S']-(Arazate).	14726–36–4	>2,000			
U406	Zinc, bis(dibutyl carbamodi thioato-S,S')-(Butyl Ziram).	136–23–2	290			

TABLE 25.—TOXICITY INFORMATION FOR PROPOSED TOXIC COMMERCIAL CHEMICAL PRODUCTS—Continued

Proposed waste code	Toxic hazardous wastes IUPAC name (common name in parentheses)	CAS No.	Oral LD50 (rat) mg/kg	Inh. LC50 (rat) mg/L 4 hr.	Dermal LC50 rabbit mg/kg	Aquatic LC50 mg/L 4 day unless noted
U407	Zinc, bis(diethyl carbamodi thioato-S,S')-(Ethyl Ziram).	14324–55–1	2,910	.....	.....	0.24/2d (DM).

BG: Blue Gill
CT: Cutthroat Trout
DL: Daphnia Laevis
DM: Daphnia Magna
DS: Daggerblade Shrimp
FM: Fathead Minnow
HF: Harlequinfish
RC: Red Crayfish
RT: Rainbow Trout
SC: Scud
TC: Tooth Carp
TD: Toad
WM: White Mullet
a: Active ingredient
b: interperitoneal
DP: Daphnia pulex
1 Recalculation involved

D. Source Reduction

In the Pollution Prevention Act of 1990 (42 U.S.C. 13101 et seq., Pub. L. 101–508, November 5, 1990), Congress declared pollution prevention the national policy of the United States. The Act declares that pollution should be prevented or reduced whenever feasible; pollution that cannot be prevented should be recycled or reused in an environmentally safe manner wherever feasible; pollution that cannot be recycled should be treated; and disposal or release into the environment should be chosen only as a last resort. While the Pollution Prevention Act gives first priority to source reduction, RCRA promotes "waste minimization." This section provides a brief discussion of some pollution prevention and waste minimization techniques that facilities may wish to consider exploring.

Pollution prevention, recycle and reuse practices fall into three general groups: Actual production practices, housekeeping practices, and practices that employ the use of equipment that by design promote pollution prevention. Some of these practices/equipment listed below conserve water, others reduce the amount of product in the waste stream, while others may prevent the creation of the waste altogether. EPA acknowledges that some of these practices/equipment may lead to media transfers or increased energy consumption. This information is presented for general information, and is not being proposed as a regulatory requirement.

Production practices include:

- Triple-rinsing raw material shipping containers and returning the rinsate directly to the reactor;
- Scheduling production to minimize changeover cleanouts;
- Segregating equipment by individual product or product "families;"
- Packaging products directly out of reactors;
- Using raw material drums for packaging final products; and
- Dedicating equipment for hard to clean products.

Housekeeping practices include:

- Performing preventative maintenance on all valves, fittings, and pumps;
- Promptly correcting leaky valves and fittings;
- Placing drip pans under valves and fitting to contain leaks;
- Cleaning up spills or leaks in bulk containment areas to prevent contamination of storm or wash wasters.

Equipment that promote pollution prevention by reducing or eliminating waste generation:

- Use of low volume—high pressure hoses for cleaning;
- Drum triple rinsing stations;
- Reactor scrubber systems designed to return captured reactants to the next batch rather than to disposal;
- Construction of material storage tanks with inert liners to prevent contamination of water blankets with contaminants which would prohibit its use in the process;
- Enclosed automated product handling equipment to eliminate manual product packaging; and
- Steam stripping wastewaters to recovery reactants or solvents for reuse.

One or more of these practices was observed to be already implemented at the facilities EPA visited during its engineering site visit and sampling effort in the carbamate industry. The Agency took note that in some cases the ability of a facility to implement further pollution preventions efforts may be inhibited by the manner in which the facility elected to comply with other existing regulations. For example, the Agency observed that facilities dedicated to one or two product lines often dedicated equipment and hence air pollution control scrubbers to the individual processes, where facilities with larger product lines and numerous reactors often chose to treat air emissions in a central control system. The result of this choice is that the facilities with fewer products were able to potentially recover reactants for reuse, while the facilities with central treatment systems generated wastes which were not reusable in any one process. The Agency seeks additional information on any other factors which might inhibit the implementation of the pollution prevention practices described, as well as information on additional pollution prevention practices.

Section 1003 of the Hazardous and Solid Waste Amendments of 1984, a nation policy under the Resource Conservation And Recovery Act (RCRA), was established to "minimize the generation of hazardous waste by encouraging process substitution, materials recovery, properly conducted recycling, and reuse and treatment." To further EPA's pollution prevention goals, the Waste Minimization Branch (WMB) in EPA's Office of Solid Waste (OSW) established the RCRA Waste Minimization Action Plan to integrate source reduction and recycling into the National RCRA Program, and RCRA activities into the Agency's Pollution

Prevention Strategy. As part of this effort, EPA attempts to incorporate pollution prevention alternatives in hazardous waste listing determinations.

The residuals reported on EPA's RCRA section 3007 carbamate questionnaire were evaluated for possible pollution prevention opportunities. Each residual and its generating process was examined for a limited number of facilities. As noted in section III.D, a number of possible pollution prevention options were identified for those residuals with waste minimization potential. EPA also performed a literature search to determine the feasibility of the pollution prevention technologies identified. The residuals were then ranked considering quantity of waste generated, impact on the environment, and pollution prevention potential.

A pollution prevention economic analysis was performed for a limited number of facilities. The economic analysis was conducted to estimate the monetary value the carbamate industry forgoes by not instituting pollution prevention programs. Two value components were estimated: Constituent value and avoided costs of disposal. Many constituent values were found in the residuals from the sampling analysis results and/or questionnaire responses. If these constituents were recovered in the production process, it would reduce the cost of raw materials. The avoided cost of disposing of the residuals was estimated using the questionnaire waste management costs. The two component values were added to determine the total revenues of avoided costs (i.e., savings to the facility by implementing pollution prevention programs).

Pollution prevention/waste minimization measures can be tailored to the needs of individual industries, processes, and firms. This approach may make it possible to achieve greater pollution reduction with less cost and disruption to the firm. The Agency's economic analysis of the carbamate industry indicates that there may be monetary benefits to be gained by implementing further waste minimization programs.

The economic analysis result was provided to each individual facility to review and comment. Since the 1990 base year of the questionnaire, some facilities have initiated pollution prevention programs while others had not considered recovering these waste streams until they received the economic analysis but felt there was a possibility for them to reclaim these wastes. The overall theme of the comments from these limited number of facilities indicates that they do not want the current or future regulations to inhibit their ability to perform source reduction and recycling efforts at their facilities.

To this end, the Agency intends to gather information on pollution prevention potential wherever feasible and thus is requesting comment on particular opportunities for additional volume and toxicity reduction through increased recycling or other process changes for carbamate wastes proposed to be listed as hazardous in this rule.

The Agency invites all parties concerned to use this open communication approach to give inputs that might help better promote pollution prevention. Through cooperative efforts such as these, the Agency can better inform the public and make enlightened decisions on regulatory matters. At the same time, the information collected as a response to this proposed rule can be assembled, evaluated, and potentially disseminated through the Agency's technology transfer program, potentially resulting in short-term positive impacts on volume reductions.

Defined process control, waste segregation, and good housekeeping practices can often result in significant volume reduction. Evaluations of existing processes may also point out the need for more complex engineering approaches (e.g., waste reuse, secondary processing of distillation bottoms, and use of vacuum pumps instead of steam jets) to achieve pollution prevention objectives. Simple physical audits of current waste generation and in-plant management practices for the wastes can also yield positive results. These audits often turn up simple non-engineering practices that can be successfully implemented.

Pollution prevention opportunities for the manufacturing processes generating carbamate wastes (K156 through K161) may potentially result in reductions in waste generation.

The Agency is interested in comments and data on such opportunities, including both successful and unsuccessful attempts to reduce waste generation, as well as the potential for volume or toxicity reductions. It is also possible that, owing to previous implementation of waste minimization procedures, some facilities or specific processes have very little potential for decreases in waste generation rates or toxicity. The Agency is particularly interested in such specific information as: (1) Data on the quantities of wastes that have been or could be reduced; (2) a means of calculating percentage reductions that are achievable (accounting for changes in production rates); (3) the potential for reduction in toxicity and mobility of the wastes; (4) the results of waste audits that have been performed; and (5) potential cost savings that can be (or have been) achieved; (6) the feasibility and cost burden that could be faced to reuse/recycle these wastes including an estimated return on investment; (7) lead time required to successfully implement a recovery and/or recycling method; or other methods (such as process modification to improve efficiency) that significantly reduce the volume and/or toxicity of the wastes; and (8) other barriers to implementation.

IV. Applicability of the Land Disposal Restrictions Determinations

A. Request for Comment on the Agency's Approach to the Development of BDAT Treatment Standards

RCRA requires EPA to make a land disposal prohibition determination for any hazardous waste that is newly identified or listed in 40 CFR part 261 after November 8, 1984, within six months of the date of identification or final listing (RCRA section 3004(g)(4), 42 U.S.C. 6924(g)(4)). EPA is also required to set "* * * levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized" (RCRA Section 3004(m)(1), 42 U.S.C. 6924(m)(1)). Land disposal of wastes that meet treatment standards thus established by EPA is not prohibited. The wastes being proposed for listing in this action would be subject to this requirement once a final rule is promulgated.

A general overview of the Agency's approach in performing analysis of how to develop treatment standards for hazardous wastes can be found in greater detail in section III.A.1 of the preamble to the final rule that set land disposal restrictions (LDR's) for the Third Third wastes (55 FR 22535, June 1, 1990). The framework for the development of the entire Land Disposal Restrictions program was promulgated November 7, 1986. (51 FR 40572).

While the Agency prefers source reduction/pollution prevention and recycling/recovery over conventional treatment, inevitably, some wastes (such as residues from recycling and inadvertent spill residues) will be generated. Thus, standards based on treatment using BDAT will be required to be developed for these wastes, if a

final rule listing them as hazardous is promulgated.

Treatment standards typically are established based on the performance data from the treatment of the listed waste or wastes with similar chemical and physical characteristics or similar concentrations of hazardous constituents. Treatment standards are established for both wastewater and nonwastewater forms on a constituent-specific basis. The constituents selected for regulation under the Land Disposal Restrictions Program are not necessarily limited to those identified as present in the listings proposed in this action, but include those constituents or parameters that will ensure that the technologies are operated properly.

Although data on waste characteristics and current management practices for wastes proposed in this action have been gathered as part of the administrative record for this rule, the Agency has not completed its evaluation of the usefulness of these data for developing specific treatment standards or assessing the capacity to treat (or recycle) these wastes.

Available treatment performance data show that incineration, chemical hydrolysis, and biological treatment are potentially applicable to carbamate wastes. These technologies have shown some promise, and the data are under review for the purpose of developing treatment standards for K156 through K161. A collection of the available treatment information has been placed in the docket for this rule.

EPA intends to propose treatment standards for K156 through K161 and the proposed P and U wastes in a separate rulemaking. However, EPA specifically is soliciting comment and data on the following as they pertain to the proposed listing of carbamate wastes K156 through K161 as described in this action:

(1) Technical descriptions of treatment systems that are or could potentially be used for these wastes;

(2) Descriptions of alternative technologies that might be currently available or anticipated as applicable;

(3) Performance data for the treatment of these or similar wastes (in particular, constituent concentrations in both treated and untreated wastes, as well as equipment design and operating conditions);

(4) Information on known or perceived difficulties in analyzing treatment residues or specific constituents;

(5) Quality assurance/quality control information for all data submissions;

(6) Factors affecting on-site and off-site treatment capacity;

(7) Information on the potential costs for set-up and operation of any current and alternative treatment technologies for these wastes;

(8) Information on waste minimization approaches.

B. Request for Comment on the Agency's Approach to the Capacity Analyses in the LDR Program

In the land disposal restrictions determinations, the Agency must demonstrate that adequate commercial capacity exists to manage the waste with BDAT standards before it can restrict the listed waste from further land disposal. The Agency performs capacity analyses to determine if sufficient alternative treatment or recovery capacity exists to accommodate the volumes of waste that will be affected by the land disposal prohibition. If adequate capacity exists, the waste is restricted from further land disposal. If adequate capacity does not exist, RCRA section 3004(h) authorizes EPA to grant a national capacity variance for the waste for up to two years or until adequate alternative treatment capacity becomes available, whichever is sooner.

To perform capacity analyses, the Agency needs to determine the volumes of the listed waste that will require treatment prior to land disposal. The volumes of waste requiring treatment depend, in turn, on the waste management practices employed by the listed waste generators. Data on waste management practices for these wastes were collected during the development of this proposed rule. However, as the regulatory process proceeds, generators may decide to minimize or recycle their wastes or otherwise alter their management practices. Thus EPA will update and monitor changes in management practices because these changes will affect the final volumes of waste requiring commercial treatment capacity. Therefore, EPA needs information on current and future waste management practices for these wastes, including the volumes of waste that are recycled, mixed with or co-managed with other waste, discharged under Clean Water Act provisions, and the volumes and types of residuals that are generated by the various management practices applicable to newly listed and identified wastes (e.g., treatment residuals).

The availability of adequate commercial treatment capacity for these wastes determines whether or not a waste is granted a capacity variance under RCRA section 3004(h). EPA continues to update and monitor changes in available commercial treatment capacity because the commercial hazardous waste management industry is extremely dynamic. For example, national commercial treatment capacity changes as new facilities come on-line, as new units and new technologies are added at existing facilities, and as facilities expand existing units. The available capacity at commercial facilities also changes as facilities change their commercial status (e.g., changing from a fully commercial to a limited commercial or captive facility). To determine the availability of capacity for treating these wastes, the Agency needs to consider currently available data, as well as the timing of any future changes in available capacity.

For previous land disposal restriction rules, the Agency performed capacity analyses using data from national surveys including the 1987 National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (the TSDR Survey) and the 1987 National Survey of Hazardous Waste Generators (the Generator Survey). However, these surveys cannot be used to determine the volumes of carbamate wastes requiring treatment, since the wastes were not included in the surveys. Additionally, these surveys may not contain adequate information on currently available capacity to treat newly identified wastes because the data reflect 1986 capacity and do not include facility expansions or closures that have occurred since then. Although adjustments have been made to these data to account for changes in waste management through 1990, this was not done on a consistent basis across all waste management practices.

Data on waste characteristics and management practices have been gathered for the purpose of the carbamates hazardous waste listing determinations in the carbamate RCRA Section 3007 survey. The Agency has compiled the capacity-related information from the survey responses and is soliciting any updated or additional pertinent information.

To perform the necessary capacity analyses in the land disposal restrictions rulemaking, the Agency needs reliable data on current waste generation, waste management practices, available alternative treatment capacity, and planned treatment capacity. The Agency will need the annual generation volumes of waste by each waste code including wastewater and nonwastewater forms, and soil or debris contaminated with these wastes and the quantities stored, treated, recycled, or disposed due to any change of management practices. The Agency also requests data from facilities capable of treating these wastes on their current treatment capacity and any plans they may have in the future to expand or reduce existing capacity. The Agency is

also requesting comments from companies that may be considering developing new hazardous waste treatment capacity. Specifically, the Agency requests information on the determining factors involved in making decisions to build new treatment capacity. Waste characteristics such as pH level, BTUs, anionic character, total organic carbon content, constituents concentration, and physical form may also limit the availability of certain treatment technologies. For these reasons, the Agency requests data and comments on waste characteristics that might limit or preclude the use of any treatment technologies.

V. State Authority

A. Applicability of Rule in Authorized States

Under section 3006 of RCRA, EPA may authorize qualified States to administer and enforce the RCRA program within the State. (See 40 CFR part 271 for the standards and requirements for authorization.) Following authorization, EPA retains enforcement authority under sections 3007, 3008, 3013, and 7003 of RCRA, although authorized States have primary enforcement responsibility.

Before the Hazardous and Solid Waste Amendments of 1984 (HSWA) amended RCRA, a State with final authorization administered its hazardous waste program entirely in lieu of the Federal program in that State. The Federal requirements no longer applied in the authorized State, and EPA could not issue permits for any facilities located in the State with permitting authorization. When new, more stringent Federal requirements were promulgated or enacted, the State was obligated to enact equivalent authority within specified time-frames. New Federal requirements did not take effect in an authorized State until the State adopted the requirements as State law.

By contrast, under section 3006(g) of RCRA, 42 U.S.C. 6926(g), new requirements and prohibitions imposed by the HSWA (including the hazardous waste listings proposed in this notice) take effect in authorized States at the same time that they take effect in non-authorized States. EPA is directed to implement those requirements and prohibitions in authorized States, including the issuance of permits, until the State is granted authorization to do so. While States must still adopt HSWA-related provisions as State law to retain final authorization, the federal HSWA requirements apply in authorized States in the interim.

B. Effect on State Authorizations

Because this proposal (with the exception of the actions proposed under CERCLA authority) will be promulgated pursuant to the HSWA, a state submitting a program modification is able to apply to receive either interim or final authorization under section 3006(g)(2) or 3006(b), respectively, on the basis of requirements that are substantially equivalent or equivalent to EPA's requirements. The procedures and schedule for State program modifications under 3006(b) are described in 40 CFR 271.21. It should be noted that all HSWA interim authorizations are currently scheduled to expire on January 1, 2003 (see 57 FR 60129, February 18, 1992).

Section 271.21(e)(2) of EPA's state authorization regulations (40 CFR part 271) requires that states with final authorization modify their programs to reflect federal program changes and submit the modifications to EPA for approval. The deadline by which the states must modify their programs to adopt this proposed regulation, if it is adopted as a final rule, will be determined by the date of promulgation of a final rule in accordance with § 271.21(e)(2). If the proposal is adopted as a final rule, Table 1 at 40 CFR 271.1 will be amended accordingly. Once EPA approves the modification, the State requirements become RCRA Subtitle C requirements.

States with authorized RCRA programs already may have regulations similar to those in this proposed rule. These State regulations have not been assessed against the federal regulations being proposed to determine whether they meet the tests for authorization. Thus, a State would not be authorized to implement these regulations as RCRA requirements until State program modifications are submitted to EPA and approved, pursuant to 40 CFR 271.21. Of course, States with existing regulations that are more stringent than or broader in scope than current Federal regulations may continue to administer and enforce their regulations as a matter of State law.

It should be noted that authorized States are required to modify their programs only when EPA promulgates Federal standards that are more stringent or broader in scope than existing Federal standards. Section 3009 of RCRA allows States to impose standards more stringent than those in the Federal program. For those Federal program changes that are less stringent or reduce the scope of the Federal program, States are not required to modify their programs. See 40 CFR 271.1(i). This proposed rule, if finalized, is neither less stringent than nor a reduction in the scope or the current Federal program and, therefore, states would be required to modify their programs to retain authorization to implement and enforce these regulations.

VI. CERCLA Designation and Reportable Quantities

All hazardous wastes listed under RCRA and codified in 40 CFR 261.31 through 261.33, as well as any solid waste that exhibits one or more of the characteristics of a RCRA hazardous waste (as defined in §§ 261.21 through 261.24), are hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. See CERCLA Section 101(14)(C). CERCLA hazardous substances are listed in Table 302.4 at 40 CFR 302.4 along with their reportable quantities (RQs). RQs are the minimum quantity of a hazardous substance that, if released, must be reported to the National Response Center (NRC) pursuant to CERCLA § 103. In this proposal, the Agency is proposing to list the proposed wastes in this action as CERCLA hazardous substances in Table 302.4 of 40 CFR 302.4, but is taking no action to adjust the one-pound statutory RQs for these substances.

Reporting Requirements. Under section 102(b) of CERCLA, all hazardous substances newly designated under CERCLA will have a statutory RQ of one pound unless and until adjusted by regulation. Under CERCLA section 103(a), the person in charge of a vessel or facility from which a hazardous substance has been released in a quantity that is equal to or exceeds its RQ shall immediately notify the NRC of the release as soon as that person has knowledge thereof. The toll free number of the NRC is 1–800–424–8802; in the Washington, DC metropolitan area, the number is (202) 426–2675. In addition to this reporting requirement under CERCLA, section 304 of the Emergency Planning and Community Right-to Know Act of 1986 (EPCRA) requires owners or operators of certain facilities to report the release of a CERCLA hazardous substance to State and local authorities. EPCRA section 304 notification must be given immediately after the release of a RQ or more to the community emergency coordinator of the local emergency planning committee for each area likely to be affected by the release, and to the State emergency response commission of any State likely to be affected by the release.

If this proposal is promulgated as a final rule, releases equal to or greater than the one-pound statutory RQ will be subject to the requirements described above, unless and until the Agency adjusts the RQs for these substances in a future rulemaking.

TABLE 26.—PROPOSED ONE-POUND STATUTORY RQS FOR PROPOSED K, P, AND U WASTES

Waste code	Constituent of concern	Statutory RQ (pounds)
K156	acetone, acetonitrile, acetophenone, aniline, benomyl, benzene, carbaryl, carbendazim, carbofuran, carbosulfan, chlorobenzene, chloroform, o-dichlorobenzene, hexane, methanol, methomyl, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, phenol, pyridine, toluene, triethylamine, xylene.	1
K157	acetone, acetonitrile, acetophenone, aniline, benomyl, carbaryl, carbofuran, carbosulfan, chloroform, o-dichlorobenzene, hexane, methanol, methomyl, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, phenol, pyridine, toluene, xylene.	1
K158	benomyl, carbendazim, carbofuran, carbosulfan, methylene chloride	1
K159	benzene, butylate, eptc, molinate, pebulate, vernolate, thiocarbamate N.O.S	1
K160	benzene, butylate, eptc, molinate, pebulate, vernolate, thiocarbamate N.O.S	1
K161	arsenic, antimony, cadmium, metam-sodium, xylene, ziram, dithiocarbamate product N.O.S	1
P185	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O- [(methylamino)carbonyl]oxime (Tirpate)	1
P187	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb)	1
P188	Benzoic acid, 2-hydroxy, compd. with (3as-cis)- 1,2,3,3a,8,8a-hexahydro-l,3a,8-trimethylpyrrolo[2,3- b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate).	1
P189	Carbamic acid, [(dibutylamino)thio]methyl-, 2,3-dihydro- 2,2-dimethyl-7-benzofuranyl ester (Carbosulfan)	1
P190	Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb)	1
P191	Carbamic acid, dimethyl-,1-[(dimethylamino)carbonyl]-5- methyl-1H-pyrazol-3-yl ester (Dimetilan)	1
P192	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H- pyrazol-5-yl ester (Isolan)	1
P193	Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl)	1
P194	Ethanimidothioc acid, 2-(dimethylamino)-N- [[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl)	1
P195	Ethanimidothioic acid, N,N'- [thiobis[(methylimino)carbonyloxy]]bis-, dimethyl ester (Thiodicarb)	1
P196	Manganese, bis(dimethylcarbamodithioato-S,S')- (Manganese dimethyldithiocarbamate)	1
P197	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4- [[(methylamino)carbonyl]oxy]phenyl]- (Formparanate)	1
P198	Methanimidamide, N,N-dimethyl-N'-[3- [[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride).	1
P201	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb)	1
P202	Phenol, 3-(1-methylethyl), methyl carbamate (Hercules AC-5727)	1
P203	Propanal, 2-methyl-2-(methylsulfonyl)-, O- [(methylamino)carbonyl] oxime (Aldicarb sulfone)	1
P204	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8- trimethyl-, methylcarbamate (ester), (3aS-cis)- (Physostigmine).	1
P205	Zinc, bis(dimethylcarbamodithioato-S,S')-, (T-4)- (Ziram)	1
U360	Carbamates N.O.S	1
U361	Carbamoyl Oximes N.O.S	1
U362	Thiocarbamates N.O.S	1
U363	Dithiocarbamate acids, salts, and/or esters N.O.S., (This listing includes mixtures of one or more dithiocarbamate acid, salt, and/or ester.).	1
U364	1,3-Benzodioxol-4-ol, 2,2-dimethyl- (Bendiocarb phenol)	1
U365	1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ester (Molinate)	1
U366	2H-1,3,5-Thiadiazine-2-thione, tetrahydro-3,5-dimethyl- (Dazomet)	1
U367	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl- (Carbofuran phenol)	1
U368	Antimony, tris(dipentylcarbamodithioato-S,S')- (Antimony trisdipentyldithiocarbamate)	1
U369	Antimony, tris[bis(2-ethylhexyl)carbamodithioato-S,S']- (Antimony tris(2-ethylhexyl)dithiocarbamate)	1
U370	Bismuth, tris(dimethylcarbamodithioato-S,S'-, (Methyl bismate)	1
U280	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban)	1
U371	Carbamic acid, [(dimethylamino)iminomethyl)] ethyl ester monohydrochloride (Hexazinone intermediate)	1
U372	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim)	1
U373	Carbamic acid, phenyl-, 1-methylethyl ester (Propham)	1
U271	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2- yl]-, methyl ester (Benomyl)	1
U374	Carbamic acid, [[3-[(dimethylamino)carbonyl]-2- pyridinyl]sulfonyl]-phenyl ester (U9069)	1
U375	Carbamic acid, butyl-, 3-iodo-2-propynyl ester (Troysan Polyphase)	1
U376	Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid (Selenium dimethyldithiocarbamate).	1
U377	Carbamodithioic acid, methyl,- monopotassium salt (Potassium n-methyldithiocarbamate)	1
U378	Carbamodithioic acid, (hydroxymethyl)methyl-, monopotassium salt (Busan 40)	1
U379	Carbamodithioic acid, dibutyl, sodium salt (Sodium dibutyldithiocarbamate)	1
U380	Carbamodithioic acid, dibutyl-, methylene ester (Vanlube 7723)	1
U381	Carbamodithioic acid, diethyl-, sodium salt (Sodium diethyldithiocarbamate)	1
U277	Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester (Sulfallate)	1
U382	Carbamodithioic acid, dimethyl-, sodium salt (Dibam)	1
U383	Carbamodithioic acid, dimethyl, potassium salt (Potassium dimethyl dithiocarbamate) (Busan 85)	1
U384	Carbamodithioic acid, methyl-, monosodium salt (Metam Sodium)	1
U385	Carbamothioic acid, dipropyl-,S-propyl ester (Vernolate)	1
U386	Carbamothioic acid, cyclohexylethyl-, S-ethyl ester (Cycloate)	1
U387	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester (Prosulfocarb)	1
U388	Carbamothioic acid, (1,2-dimethylpropyl) ethyl-, S- (phenylmethyl) ester (Esprocarb)	1
U389	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3- trichloro-2-propenyl) ester (Triallate)	1
U390	Carbamothioic acid, dipropyl-, S-ethyl ester (Eptam)	1

TABLE 26.—PROPOSED ONE-POUND STATUTORY RQS FOR PROPOSED K, P, AND U WASTES—Continued

Waste code	Constituent of concern	Statutory RQ (pounds)
U391	Carbamothioic acid, butylethyl-, S-propyl ester (Pebulate)	1
U392	Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester (Butylate)	1
U393	Copper, bis(dimethylcarbamodithioato-S,S')- (Copper dimethyldithiocarbamate)	1
U394	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester (A2213)	1
U395	Ethanol, 2,2'-oxybis-, dicarbamate (Reactacrease 4-DEG)	1
U396	Iron, tris(dimethylcarbamodithioato-S,S')-, (Ferbam)	1
U397	Lead, bis(dipentylcarbamodithioato-S,S')-1.	
U398	Molybdenum, bis(dibutylcarbamothioato)di-.mu.-oxodioxodi-, sulfurized	1
U399	Nickel, bis(dibutylcarbamodithioato-S,S')- (Nickel dibutyldithiocarbamate)	1
U400	Piperidine, 1,1'-(tetrathiodicarbonothioyl)-bis- (Sulfads)	1
U401	bis(dimethylthiocarbamoyl) sulfide (Tetramethylthiuram monosulfide)	1
U402	Thioperoxydicarbonic diamide, tetrabutyl (Butyl Tuads)	1
U403	Thioperoxydicarbonic diamide, tetraethyl (Disulfiram)	1
U404	Zinc, bis[bis(phenylmethyl)carbamodithioato-S,S']- (Arazate)	1
U405	Zinc, bis(dibutylcarbamodithioato-S,S')- (Butyl Ziram)	1
U406	Zinc, bis(diethylcarbamodithioato-S,S')- (Ethyl Ziram)	1

VII. Compliance Dates

A. Notification

Under the RCRA section 3010 any person generating, transporting, or managing a hazardous waste must notify EPA (or an authorized State) of its activities. Section 3010(a) allows EPA to waive, under certain circumstances, the notification requirement under section 3010 of RCRA. If these hazardous waste listings are promulgated, EPA is proposing to waive the notification requirement as unnecessary for persons already identified within the hazardous waste management universe (i.e., persons who have an EPA identification number under 40 CFR 262.12). EPA is not proposing to waive the notification requirement for waste handlers who have neither notified the Agency that they may manage hazardous wastes nor received an EPA identification number. Such individuals will have to provide notification under section 3010.

B. Interim Status and Permitted Facilities

Because HSWA requirements are applicable in authorized States at the same time as in unauthorized States, EPA will regulate K156 through K161 and the P and U listed wastes until States are authorized to regulate these wastes. Thus, once this regulation becomes effective as a final rule, EPA will apply Federal regulations to these wastes and to their management in both authorized and unauthorized States.

VIII. Executive Order 12866

Under Executive Order 12866, [58 FR 51735 (October 4, 1993)] the Agency must determine whether the regulatory action is "significant" and therefore subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affects in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interferes with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a "significant regulatory action" because of policy issues arising out of legal mandates. As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

IX. Economic Impact Analysis

This section of the preamble summarizes the costs and the economic impact analysis (EIA) for the proposed carbamate hazardous waste listings. Based upon the EIA for this proposal, the Agency estimates that the listing of the six carbamate production wastes discussed above may result in nationwide annualized costs of at least $890,000. A complete discussion of the EIA is available in the regulatory docket for this proposed rule in a report entitled "Economic Impact Analysis of the Identification and Listing of Carbamate Production Waste," January 26, 1994.

A. Compliance Costs for Proposed Listings

The remainder of this section briefly describes (1) the universe of carbamate production facilities and volumes of carbamate production wastes in the 6 waste groups proposed for hazardous waste listing, (2) the methodology for determining incremental cost and economic impacts to regulated entities, and (3) the regulatory flexibility analysis. Results of the analysis are summarized in section 3, Tables 30 and 31.

1. Universe of Carbamate Production Facilities and Waste Volumes

In order to estimate costs for the EIA, it was first necessary to estimate total annual generation of carbamate production wastes. As described in section III of this preamble, the carbamate production industry is composed of 64 chemical products produced by 20 manufacturers at 24 facilities. Total annual waste quantities generated by these facilities were derived from a 1990 survey of the carbamate production industry. Table 27 presents the total waste quantities reported, by waste group, for the carbamate production industry.

TABLE 27.—1990 TOTAL WASTE QUANTITIES OF CONCERN, BY WASTE GROUP, REPORTED BY THE CARBAMATE PRODUCTION INDUSTRY

Waste category (Quantities given in Metric tons per year)	Total quantity reported
Category 1—Organic wastes from the production of carbamates and carbamoyl oximes	126,000
Category 2—Wastewaters from the production of carbamates and carbamoyl oximes	269,000

TABLE 27.—1990 TOTAL WASTE QUANTITIES OF CONCERN, BY WASTE GROUP, REPORTED BY THE CARBAMATE PRODUCTION INDUSTRY—Continued

Waste category (Quantities given in Metric tons per year)	Total quantity reported
Category 3—Solids from the production of carbamates an carbamoyl oximes	1,390
Category 4—Organic wastes from the production of thiocarbamates	500
Category 5—Wastewaters from the production of thiocarbamates	344,000
Category 6—Solids from the production of thiocarbamates	700
Category 7—Process wastewater from the production of dithiocarbamates	51,000
Category 8—Reactor vent scrubber water from the production of dithiocarbamates	46,000
Category 9—Purification solids from the production of dithiocarbamates	3,400
Category 10—Organic wastes from the production of dithiocarbamates	400
Total:	[a] 839,500

[a] Numbers may not add due to rounding.

2. Method for Determining Cost and Economic Impacts

This section details EPA's approach for estimating the incremental compliance cost and the economic impacts attributable to the listing of carbamate production waste. Because the carbamate production industry is relatively small (only 20 manufacturers at 24 facilities in 1990), EPA was able to collect facility-specific information and estimate incremental costs at the waste stream level. The information used in this analysis was collected in 1990 under the authority of a RCRA section 3007 survey; the survey included engineering site visits, and sampling and analysis of waste streams.

Approach to the Cost Analysis

EPA's approach to the cost analysis for this proposal was to compare the cost of current management practices, as reported in the 3007 survey of carbamate production facilities, with the projected cost of management to comply with the RCRA Subtitle C hazardous waste program as would be required by the proposed rule. This difference in cost, when annualized,[9] represents the incremental annual compliance cost attributable to the proposed rule.

Baseline or Current Management Scenario

Relying on survey responses and engineering site visits, EPA was able to determine the current (i.e., 1990) management practices for the handling and disposal of carbamate production wastes. Current management practices varied among facilities and waste streams, and included such practices as off-site incineration, deep-well disposal, on-site destruction in boilers, and off-site landfilling. These current management practices at each facility represent the baseline scenario of the analysis.

As part of the 3007 survey, EPA asked each facility to identify current costs for the management of carbamate production wastes. For this analysis, EPA has relied on and has not changed the industry's own waste-specific estimates concerning the cost of current management. EPA realizes that future events such as waste minimization efforts or increased demand for carbamate products may change waste generation volumes and, thus, future waste management costs.

Post-Regulatory Management Scenarios

In predicting how industry would comply with the listing of carbamate production waste as RCRA hazardous waste, EPA developed nine post-regulatory management scenarios, described below, that represent plausible management reactions on the part of industry. EPA developed these post-regulatory management categories based on its knowledge of current waste management and the physical and chemical properties of the waste.

Management Category (MC) 1: Wastes Currently Managed as Hazardous Waste, Either On or Off Site

EPA assumed in this post-regulatory scenario, that wastes would continue to be managed as in the baseline scenario. On-site hazardous waste management implies that there already exists a RCRA Subtitle C permitted (or interim status) unit at the facility, such as a RCRA permitted incinerator. If wastes are managed as hazardous on site, the incremental change due to the proposed rule would be to modify the RCRA permit (or interim status/permit application) to account for the new listing of carbamate production waste.[10] If wastes are managed as hazardous off site, the incremental change would be the cost from the completion of a waste generator manifest.

Management Category 2: Wastes Currently Managed in Boilers Subject to BIF Requirements[11]

EPA assumed that these wastes would continue to be managed in boilers. If the boiler is on site, costs for a Class II incinerator permit modification and manifest and biennial reporting would be incurred, similar to management Category 1. If the waste is sent to off-site boilers subject to BIF requirements, the only incremental cost would be that for completing the manifest.

Management Category 3: Wastes Currently Managed in On Site, Subtitle D, Non-hazardous Waste Incinerators

EPA assumed that post-regulatory management would be off site at the nearest commercial hazardous waste (i.e., RCRA Subtitle C permitted) incinerator.[12] In addition to the commercial treatment and transportation costs, the post-regulatory management of these wastes would include contingency plan maintenance, biennial reporting, and manifesting.

Management Category 4: Wastes Currently Discharged Under National Pollution Discharge Elimination System (NPDES) Permits, Treated at Publicly Owned Treatment Works (POTWs) Under the Clean Water Act, Privately Owned Treatment Works, or On-Site Wastewater Treatment Systems

EPA assumed that the post-regulatory management of these wastes as a result of this proposal would be the same as baseline management, because the systems or wastes would still be, either exempt from RCRA regulation (see 40 CFR 264.1(g)(6)), or that the systems are already covered under a RCRA permit by rule (see 40 CFR 265.1(c)(10)), and would therefore not incur any significant incremental costs. Consequently, the only incremental cost attributed to this proposal is for contingency plan maintenance and biennial reporting.

Management Categories 5 and 6: Wastes Currently Being Recycled (Category No. 5) or Recovered (Category No. 6)

No incremental cost is attributed to these waste volumes as recycled wastes were assumed to be exempt from RCRA Subtitle C regulation.[13]

[9] Costs are discounted at a rate of 7 percent over a 20 year period.

[10] For this category, EPA assumed that the facility would need a RCRA Class II permit modification to the facility's annual contingency plan maintenance and biennial reporting.

[11] Boilers and Industrial Furnaces.

[12] EPA estimated each of facility-to-commercial incinerator distance from road maps.

[13] Because of the complexities of RCRA recycling and reuse, it is possible that these carbamate production wastes are recycled in a manner that is

Management Category 7: Wastes Currently Managed Off Site in Subtitle D, Non-Hazardous Waste Incinerators

EPA assumed that this waste will continue to be shipped off site, but to the nearest commercial hazardous waste incinerator. In addition to treatment costs, incremental costs would include those for contingency plan maintenance, manifesting, and biennial reporting.

Management Categories 8 and 9: Wastes Currently Managed in Subtitle D Landfills (Category No. 8 for Wastes Managed Off Site, and Category No. 9 for Wastes Managed On Site)

In the post-regulatory scenario, wastes in both categories would be shipped off site to the nearest commercial Subtitle C hazardous waste landfill. Commercial landfilling costs, biennial reporting, and manifesting would present incremental costs associated with this proposal.

Management Category 10: Segregation of Subtitle D Wastes Currently Commingled

In the post-regulatory scenario, wastes currently commingled with industrial or process trash and managed in Subtitle D landfills may incur separation costs. The process trash will be managed in the current fashion, while the listed waste will be managed under Subtitle C facilities. Carbamate producers must devote labor and capital to separate these materials and devote space to storage.

Unit costs for Subtitle C treatment (i.e., incineration) or land disposal, waste transportation between facilities, permit modifications, maintenance of contingency plans, manifesting and biannual reporting system (BRS) reporting are contained in Table 28 below. The total volume of waste affected by each waste management category described above are presented below in Table 29. EPA requests comments on these cost estimates.

TABLE 28.—POST-REGULATORY WASTE MANAGEMENT UNIT COST ESTIMATES

	Cost (1992 $)	Source
Commercial hazardous waste incineration	$1,600 per metric ton	SAIC/ICF analysis.
Commercial hazardous waste landfill	$200 per metric ton	SAIC/ICF analysis.
Hazardous waste transportation	$0.27 per metric ton per mile if under 200 miles $0.24 per metric ton per mile if over 200 miles	SAIC analysis.
Class II on-site hazardous waste landfill permit modification[1].	$80,102	ICF analysis.
Class II on-site hazardous waste incinerator permit modification[1].	$40,585	ICF analysis.
Other class II on-site hazardous waste treatment permit modification.	$7,476	ICF analysis.
Segregation of industrial Subtitle D waste	$10 per metric ton	EPA estimate.
Maintenance of contingency plan	$200 per facility per year	Source a.
Manifesting[2]	$36 per shipment	Sources b, c.
BRS reporting	$428 per facility per year	Sources c, d.

[1] Permit modification costs were assumed to be incurred no more than once for each type of treatment at each facility. These costs were annualized over 20 years using a discount rate of 7 percent.

[2] Manifest completion costs were assumed to be incurred once a year for each waste shipped off site. One shipment was assumed to equal one truckload of 20 tons.

Sources: a. "Estimating Costs for the Economic Benefits of RCRA Non-compliance," Draft Report prepared by DPRA for Office of Waste Programs Enforcement, U.S. Environmental Protection Agency, May 1993.

b. ICF No. 801 "Requirements for Generators, Transporters, and Waste Management Facilities Under the RCRA Hazardous Waste Manifest System," June 15, 1992.

c. *Employment and Earnings*, Bureau of Labor Statistics, March 1993.

d. "1991 Hazardous Waste Report," U.S. Environmental Protection Agency.

TABLE 29.—TOTAL CARBAMATE PRODUCTION WASTE QUANTITIES AND TOTAL INCREMENTAL ANNUAL COST INCURRED BY EACH POST-REGULATORY WASTE MANAGEMENT CATEGORY

Post-regulatory waste management scenario	Total quantity of carbamate production waste affected (in metric tons)	Total annualized incremental cost incurred
MC 1	234,000	$25,600
MC 2	6,400	8,200
MC 3	1	700
MC 4	809,900	776,700
MC 5 and 6	2,700	200
MC 7	0	20
MC 8 and 9	200	58,100
MC 10	4,100	41,000
Total[1]	840,000	910,000

[1] Numbers may not add due to rounding.

not exempt from RCRA permitting and other requirements. Without further investigation of each process configuration it is impossible to determine which wastes would continue to be recycled or recovered in the post-regulatory scenario. There are 2,630 metric tons assigned to management categories 5 and 6, if all this waste was to be shipped off site to a Subtitle C hazardous waste landfill (at $200/metric ton), then the incremental annualized cost reported in this analysis would increase by at least $530,000.

Specific Analysis of K157 Wastewaters

EPA examined two scenarios for the post-regulatory management of K157 wastewaters. The first scenario assumed that K157 wastewaters would continue to be sent through NPDES-permitted discharges or to POTWs, but that (1) sludge would be managed as hazardous waste, (2) surface impoundments would be closed and converted to tanks. The second scenario assumed that wastewaters would be treated by steam stripping before discharge into centralized wastewater treatment systems. Exemption of these sludges from the definition of hazardous waste was found to not impact the incremental costs, which are dominated by impoundment conversion costs.

For the first K157 wastewater scenario, EPA reviewed the information collected as part of the RCRA section 3007 survey. The facility-specific information shows that only two facilities employ operational surface impoundments (as of 1990). EPA thus calculated the costs associated with the closure of the surface impoundments and conversion to tanks. The EIA technical background document contains details of these cost calculations. EPA estimated that the costs associated with the first scenario to be approximately $760,000 per year.

For the second K157 wastewater scenario, EPA explored the possibility of off-site steam stripping as well as constructing on-site steam stripping units. EPA identified seven facilities with K157 wastewater streams in significant quantities to merit construction of on-site steam stripping units. For these facilities, EPA calculated rough engineering cost estimates for the on-site systems, both for capital costs and annual operation and maintenance. EPA identified two additional facilities which did not produce significant quantities of K157 wastewaters to merit construction of on-site steam stripping units. For volumes generated by these facilities (approximately 400 tons), EPA estimated the total annualized cost of off-site steam stripping.[14] The total estimated annualized cost for scenario two is $6.4 million.

Because the K157 incremental annualized cost of scenario two is more than seven times that of scenario one, EPA assumed that industry would minimize its cost by adopting the lower-cost management.[15] The costs estimated for scenario one have been used in the total costs for K157 wastes reported below.

3. P and U List Wastes

EPA has not estimated the amounts of P and U wastes that are generated annually by the carbamate producers or wastes resulting from spills or other one-time generation occurrences. EPA would appreciate any comment concerning the costs of on-going P and U waste generation as well as costs resulting from spills and other such incidents. Similarly, EPA has not explored the possible use of carbamate products for the precipitation of metals in the waste treatment of other industries.

4. Potential Remedial Action Costs

In addition to carbamate process wastes, the proposed carbamate hazardous waste listing could affect the management of soils, ground water, and other remedial materials. The Agency's "contained in" policy defines certain remediation wastes "containing" a listed hazardous waste as a RCRA hazardous waste. It is possible that areas of past carbamate waste management, spills, or disposal, which met the proposed K156–K161 listing description at the time they were placed on the land, may still have contaminant concentrations which exceed "contained in" levels. A person who disturbs such material could become a generator of RCRA hazardous waste. The likelihood of this imposing a significant additional burden is low since at least 22 of 24 carbamate production facilities are already permitted TSDFs. Releases from all solid waste management units at these TSDFs, including those that in the future would be found to contain a waste meeting the carbamate listing descriptions, are already covered by facility-wide cleanup rules under 40 CFR 264.101. This issue would be more likely to arise from historical offsite management at facilities that were not TSDs.

There are two remedial possibilities for land containing this material. First, it may be possible to not disturb the contaminated area or manage the material in place with source controls or in situ treatment and thus avoid generating a hazardous waste. Owners may be unable to make full value use of the land. In this case, the cost under this scenario is the difference between the cost of the land at its highest valued use and the cost of the land at the lower value. The Agency also recognizes that under this alternative property owners surrounding these locations may experience a change in their property values but this is difficult to evaluate. Second, owners may excavate the material. If the material contains a hazardous waste owners would bear hazardous waste treatment, disposal, management, and potentially permitting costs. Owners and EPA are likely to prefer the first alternative when that action is protective of human health and the environment.

The Agency requests comment on the likely costs associated with remediation of wastes found to contain the wastes identified for listing in today's proposal. The Agency is interested in estimates of potential remedial wastes that would be defined as hazardous under RCRA because of this proposed listing and the potential management costs. EPA specifically requests comments on the number of carbamate production facilities already subject to federal (e.g., RCRA Corrective Action) or state authorities compelling owners to clean up their entire facility, including areas of past K165–K161 management, both onsite and offsite.

5. Summary of Results

Table 30 presents a summary of estimated national incremental annualized compliance costs, by waste group,[16] associated with this proposal to list certain carbamate production wastes as hazardous.

TABLE 30.—SUMMARY OF ESTIMATED NATIONAL INCREMENTAL ANNUALIZED COMPLIANCE COSTS (1992 DOLLARS/YEAR) [1]

Waste group	RCRA waste code	Annual incremental compliance cost
1	K156	$14,000
2	K157	770,000
3	K158	37,000
4	K159	1,200
6	K160	2,100
9	K161	69,000
Total		[2] 890,000

[1] Nurnbers may not add up due to rounding.
[2] EPA also estimated the incremental compliance costs associated with waste groups 5, 7, 8 and 10, which are not recommended for listing under today's proposal. If listed, total incremental annual compliance costs for these waste groups are estimated to be $22,000.

Table 30 presents the annual incremental compliance costs as they correspond to the RCRA waste codes proposed for listing (i.e., K156 through K160). Please note that these codes correspond directly to the waste groups proposed for listing under this proposal (i.e., groups 1, 2, 3, 4, 6 and 9). As indicated in Table 30 the total annual incremental compliance cost attributable to this proposal is $890,000. Waste category 2 (i.e., K157—wastewaters from the production of carbamates and carbamoyl oximes) constitutes 86[17] percent of national incremental compliance cost. Waste category 9 (i.e., K161—purification solids, bag-house dust, and floor

[14] Recent vendor quotes of off-site steam-stripping showed a cost of $0.75 per gallon (approximately $200 per metric ton).

[15] EPA also considered facility specific comparisons between scenarios one and two. It should be noted that, under scenario one, given the worst possible case (conversion of three surface impoundments, one tank cover and sludge disposal) costs were still favorable to those that would be incurred by the same facility under scenario two.

[16] For a detailed description of these waste groupings, please refer to Table 27 of this preamble.

[17] The bulk of this cost (99 percent) is attributable to one facility for the conversion of three surface impoundments to tanks. The ratio of total annual incremental cost that would be incurred by this facility, to annual revenues for the entire company, is less than 1 percent.

sweepings from the production of dithiocarbamates) constitutes 5 percent; and waste category 3 (i.e., K158—solids from the production of carbamate and carbamoyl oxime products) constitutes 3 percent of national incremental compliance cost. The remaining 1 percent are distributed among other waste groups.

B. Regulatory Flexibility Analysis

Table 31 presents the estimated annualized incremental compliance costs borne by the five small businesses [18] in the carbamate production industry. The annual incremental cost of the rule for the five facilities ranged from $628 to $772. The greatest ratio of compliance cost to sales is 0.01%, thus, EPA concluded that no small businesses are significantly affected by this rule.

TABLE 31.—RESULTS OF THE REGULATORY FLEXIBILITY ANALYSIS

Facility	Annual incremental cost of rule	Annual sales (millions)	Annual cost of compliance/annual sales (percent)
1	$772	$17.8	<0.01
2	628	110	<0.01
3	664	6.6	<0.01
4	628	45	<0.01
5	736	19	<0.01

X. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) of 1980 requires Federal agencies to consider "small entities" throughout the regulatory process. Section 603 of the RFA requires an initial screening analysis to be performed to determine whether small entities will be affected by the regulation. If affected small entities are identified, regulatory alternatives must be considered which mitigate the potential impacts. Small entities as described in the Act are only those "businesses, organizations and governmental jurisdictions subject to regulation."

If, however, the head of the Agency certifies that the rule will not have a significant impact on a substantial number of small entities, no regulatory flexibility analysis is required. Of the 24 entities which are directly subject to this proposed rule, 18 entities would incur incremental compliance costs. Of the 18 affected facilities, 4 entities fit the definition of a "small entity" as defined by the Regulatory Flexibility Act.[19] The annual incremental cost impact to these 4 entities ranges from $600 to $800. For each of the 4 facilities impacted, these annual costs constitute less than 1 percent of total annual sales. EPA believes that these costs do not represent a significant impact. Hence, pursuant to section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), "the Administrator certifies that this rule will not have a significant economic impact on a substantial number of entities."

XI. Paperwork Reduction Act

This rule does not contain any information collection requirements subject to OMB review under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 et seq.

List of Subjects

40 CFR Part 261

Environmental protection, Hazardous materials, Waste treatment and disposal, Recycling.

40 CFR Part 271

Environmental protection, Administrative practice and procedure, Confidential business information, Hazardous material transportation, Hazardous waste, Indians—lands, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements, Water pollution control, Water supply.

40 CFR Part 302

Environmental protection, Air pollution control, Chemicals, Emergency Planning and Community Right-to-Know Act, Extremely hazardous substances, Hazardous chemicals, Hazardous materials, Hazardous materials transportation, Hazardous substances, Hazardous wastes, Intergovernmental relations, Natural resources, Pesticides and pests, Reporting and recordkeeping requirements, Superfund, Waste treatment and disposal, Water pollution control, Water supply.

Dated: January 31, 1994.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, 40 CFR parts 261, 271, and 302 are proposed to be amended as follows:

Part 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

1. The authority citation for Part 261 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, and 6938.

2. Section 261.3 is amended by adding paragraphs (a)(2)(iv)(F) and (c)(2)(ii)(D) to read as follows.

§ 261.3 Definition of hazardous waste.

(a) * * *

(2) * * *

(iv) * * *

(F) One or more of the following wastes listed in § 261.32—wastewaters from the production of carbamates and carbamoyl oximes (EPA Hazardous Waste No. K157)—provided that the maximum weekly usage of formaldehyde, methyl chloride, methylene chloride, and triethylamine (including all amounts that cannot be demonstrated to be reacted in the process or is recovered, i.e., what is discharged or volatilized) divided by the average weekly flow of process wastewater prior to any dilutions into the headworks of the facility's wastewater treatment system does not exceed a total of 5 parts per million by weight.

* * * * *

(c) * * *

(2) * * *

(ii) * * *

(D) Biological treatment sludge from the treatment of one of the following wastes listed in § 261.32—wastewaters from the production of carbamates and carbamoyl oximes (EPA Hazardous Waste No. K157).

* * * * *

3. Section 261.32 is amended by adding in alphanumeric order (by the first column) the following waste streams to the subgroup "Pesticides" to read as follows.

§ 261.32 Hazardous wastes from specific sources.

* * * * *

[18] A small business is defined by the Small Business Size Regulations (13 CFR part 121) as one with under 500 employees.

[19] According to "EPA Guidelines for Implementing the Regulatory Flexibility Act" (April, 1992), any producer of pesticides and agricultural chemicals (SIC 2879) with less than 500 employees constitutes a "small entity." None of the entities which would incur incremental compliance costs as a result of this proposal have less than 500 employees.

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
	* * * * *	
K156	Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes.	(T)
K157	Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes.	(T)
K158	Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes.	(T)
K159	Organics from the treatment of thiocarbamate wastes	(T)
K160	Solids (including filter wastes, separation solids, and spent catalysts) from the production of thiocarbamates and solids from the treatment of thiocarbamate wastes.	(T)
K161	Purification solids (including filtration, evaporation, and centrifugation solids), baghouse dust and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.).	(R,T)
	* * * * *	

4. Sections 261.33(e) and (f) are amended by adding in alphabetic order (by the third column) the following substances to read as follows:

§ 261.33 Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof.

(e) * * *

* * * * *

Hazardous waste No.	Chemical abstracts No.	Substance
*	*	*
P187	22781–23–3	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb).
P127	1563–66–2	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate (Carbofuran).
P188	57–64–7	Benzoic acid, 2-hydroxy, compd. with (3aS-cis)- 1,2,3,3a,8,8a-hexahydro-1,3a,8- trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate).
*	*	*
P189	55285–14–8	Carbamic acid, [(dibutylamino)thio]methyl-, 2,3- dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan).
P191	644–64–4	Carbamic acid, dimethyl-, 1- [(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan).
P192	119–38–0	Carbamic acid, dimethyl-, 3-methyl-1-(1- methylethyl)-1H-pyrazol-5-yl ester (Isolan).
P190	1129–41–5	Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb).
P193	23564–05–8	Carbamic acid, [1,2- phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl).
*	*	*
P185	26419–73–8	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O- [(methylamino)carbonyl]oxime (Tirpate).
*	*	*
P194	23135–22–0	Ethanimidothioc acid, 2-(dimethylamino)-N- [[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl).
P195	59669–26–0	Ethanimidothioic acid, N,N'- [thiobis[(methylimino)carbonyloxy]]bis-, dimethyl ester (Thiodicarb).
*	*	*
P196	15339–36–3	Manganese, bis(dimethylcarbamodithioato-S,S')-, (Manganese dimethyldithiocarbamate).
*	*	*
P198	23422–53–9	Methanimidamide, N,N-dimethyl-N'-[3- [[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride).
P197	17702–57–7	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4- [[(methylamino)carbonyl]oxy]phenyl]- (Formparanate).
*	*	*
P128	315–18–4	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester) (Mexacarbate).
P199	2032–65–7	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate (Methiocarb).
*	*	*
P200	114–26–1	Phenol, 2-(1-methylethoxy)-, methylcarbamate (Propoxur).
P202	64–00–6	Phenol, 3-(1-methylethyl), methyl carbamate (Hercules AC–5727).
*	*	*
P201	2631–37–0	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb).

Hazardous waste No.	Chemical abstracts No.	Substance
*	*	* * * * * * *
P203	1646–88–4	Propanal, 2-methyl-2-(methylsulfonyl)-, O- [(methylamino)carbonyl] oxime (Aldicarb sulfone).
*	*	* * * * * * *
P204	57–47–6	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro- 1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)- (Physostigmine).
*	*	* * * * * * *
P205	137–30–4	Zinc, bis(dimethylcarbamodithioato-S,S')-, (Ziram).
*	*	* * * * * * *
(l) * * *		
*	*	* * * * * * *
U369	15991–76–1	Antimony, tris[bis(2-ethylhexyl)carbamodithioato- S,S']-, (Antimony tris(2-ethylhexyl)dithiocarbamate).
U368	15890–25–2	Antimony tris(dipentylcarbamodithioato-S,S')- (Antimony trisdipentyldithiocarbamate).
U365	2212–67–1	1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ester (Molinate).
*	*	* * * * * * *
U364	22961–82–6	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol).
U367	1563–38–8	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl- (Carbofuran phenol).
*	*	* * * * * * *
U401	97–74–5	Bis(dimethylthiocarbamoyl) sulfide (Tetramethylthiuram monosulfide).
U370	21260–46–8	Bismuth, tris(dimethylcarbamodithioato-S,S'-, (Methyl bismate).
*	*	* * * * * * *
U360	.....	Carbamates N.O.S.
U372	10605–21–7	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim).
U271	17804–35–2	Carbamic acid, [1-[(butylamino)carbonyl]-1H- benzimidazol-2-yl]-, methyl ester (Benomyl).
U375	55406–53–6	Carbamic acid, butyl-, 3-iodo-2-propynyl ester (Troysan Polyphase).
U280	101–27–9	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2- butynyl ester (Barban).
U380	10254–57–6	Carbamodithioic acid, dibutyl-, methylene ester (Vanlube 7723).
U277	95–06–7	Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester (Sulfallate).
U374	112006–94–7	Carbamic acid, [[3-[(dimethylamino)carbonyl]-2- pyridinyl]sulfonyl]-phenyl ester (U9069).
U371	65086–85–3	Carbamic acid, [(dimethylamino)iminomethyl)] methyl, ethyl ester monohydrochloride (Hexazinone intermediate).
*	*	* * * * * * *
U373	122–42–9	Carbamic acid, phenyl-, 1-methylethyl ester (Propham).
*	*	* * * * * * *
U379	136–30–1	Carbamodithioic acid, dibutyl, sodium salt (Sodium dibutyldithiocarbamate).
U381	148–18–5	Carbamodithioic acid, diethyl-, sodium salt (Sodium diethyldithiocarbamate).
U383	128–03–0	Carbamodithioic acid, dimethyl, potassium salt (Potassium dimethyl dithiocarbamate) (Busan 85).
U382	128–04–1	Carbamodithioic acid, dimethyl-, sodium salt (Dibam).
U376	144–34–3	Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid (Selenium dimethyldithiocarbamate).
*	*	* * * * * * *
U378	51026–28–9	Carbamodithioic acid, (hydroxymethyl)methyl-, monopotassium salt (Busan 40).
U384	137–42–8	Carbamodithioic acid, methyl-, monosodium salt (Metam Sodium).
U377	137–41–7	Carbamodithioic acid, methyl,- monopotassium salt (Potassium n-methyldithiocarbamate).
*	*	* * * * * * *
U389	2303–17–5	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3- trichloro-2-propenyl) ester (Triallate).
U392	2008–41–5	Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester (Butylate).
U391	1114–71–2	Carbamothioic acid, butylethyl-, S-propyl ester (Pebulate).
U386	1134–23–2	Carbamothioic acid, cyclohexylethyl-, S-ethyl ester (Cycloate).
U388	85785–20–2	Carbamothioic acid, (1,2-dimethylpropyl) ethyl-, S- (phenylmethyl) ester (Esprocarb).
U390	759–94–4	Carbamothioic acid, dipropyl-, S-ethyl ester (Eptam).
U385	1929–77–7	Carbamothioic acid, dipropyl-, S-propyl ester (Vernolate).
U387	52888–80–9	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester (Prosulfocarb).
U361	.....	Carbamoyl Oximes N.O.S.
*	*	* * * * * * *
U393	137–29–1	Copper, bis(dimethylcarbamodithioato-S,S')-, (Copper dimethyldithiocarbamate).

Hazardous waste No.	Chemical abstracts No.	Substance
*	*	*
U363	.....	Dithiocarbamate acids, salts, and/or esters, N.O.S. (This listing includes mixtures of one or more dithiocarbamic acid, salt, or ester.)
*	*	*
U404	101–44–8	Ethanamine, N,N-diethyl- (Triethylamine).
*	*	*
U394	30558–43–1	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy- 2-oxo-, methyl ester (A2213).
*	*	*
U395	5952–26–1	Ethanol, 2,2'-oxybis-, dicarbamate (Reactacrease 4-DEG).
*	*	*
U396	14484–64–1	Iron, tris(dimethylcarbamodithioato-S,S')-, (Ferbam).
*	*	*
U397	36501–84–5	Lead, bis(dipentylcarbamodithioato-S,S')-
*	*	*
U398	68412–26–0	Molybdenum, bis(dibutylcarbamothioato)di-.mu.- oxodioxodi-, sulfurized.
*	*	*
U279	63–25–2	1-Naphthalenol, methylcarbamate (Carbaryl).
*	*	*
U399	13927–77–0	Nickel, bis(dibutylcarbamodithioato-S,S')- (Nickel dibutyldithiocarbamate).
*	*	*
U400	120–54–7	Piperidine, 1,1'-(tetrathiodicarbonothioyl)-bis (Sulfads).
*	*	*
U366	533–74–4	2H-1,3,5-Thiadiazine-2-thione, tetrahydro-3,5- dimethyl- (Dazomet).
U362	.....	Thiocarbamates N.O.S.
*	*	*
U402	1634–02–2	Thioperoxydicarbonic diamide, tetrabutyl (Butyl Tuads).
U403	97–77–8	Thioperoxydicarbonic diamide, tetraethyl (Disulfiram).
*	*	*
U405	14726–36–4	Zinc, bis[bis(phenylmethyl)carbamodithioato-S,S']- (Arazate).
U406	136–23–2	Zinc, bis(dibutylcarbamodithioato-S,S')- (Butyl Ziram).
U407	14324–55–1	Zinc, bis(diethylcarbamodithioato-S,S')- (Ethyl Ziram).
*	*	*

5. Appendix VII to Part 261 is amended by adding the following waste streams in alphanumeric order (by the first column) to read as follows.

APPENDIX VII TO PART 261.—BASIS FOR LISTING HAZARDOUS WASTE

EPA hazardous waste No.	Hazardous constituents for which listed
*	*
K156	Acetone, acetonitrile, acetophenone, aniline, benomyl, benzene, carbaryl, carbendazim, carbofuran, carbosulfan, chlorobenzene, chloroform, o-dichlorobenzene, hexane, methanol, methomyl, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, phenol, pyridine, toluene, triethylamine, xylene.
K157	Acetone, carbon tetrachloride, formaldehyde, methomyl, methyl isobutyl ketone, methyl chloride, methylene chloride, o-phenylenediamine, pyridine, triethylamine.
K158	Benomyl, carbendazim, carbofuran, carbosulfan, chloroform, hexane, methanol, methylene chloride, phenol, xylene.
K159	Benzene, butylate, eptc, molinate, pebulate, vernolate, thiocarbamate N.O.S.
K160	Benzene, butylate, eptc, molinate, pebulate, vernolate, thiocarbamate N.O.S.
K161	Metam-sodium, xylene, ziram, dithiocarbamate product N.O.S.

* * * * *

6. Appendix VIII of Part 261 is amended by adding the following hazardous constituents in alphabetical order (by the first column) to read as follows.

APPENDIX VIII TO PART 261.—HAZARDOUS CONSTITUENTS

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
* * *	* * * * *		
A2213	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester.	30558-43-1	U394
* * *	* * * * *		
Acetone	2-Propanone	67-64-1	K156
* * *	* * * * *		
Aldicarb sulfone	Propanal, 2-methyl-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime.	1646-88-4	P203
* * *	* * * * *		
Antimony tris(2-ethylhexyl)dithiocarbamate	Antimony, tris[bis(2- ethylhexyl)carbamodithioato-S,S']-,	15991-76-1	U369
Antimony trisdipentyldithio-carbamate	Antimony tris (dipentylcarbamodithioato-S,S')-	15890-25-2	U368
* * *	* * * * *		
Arazate	Zinc, bis[bis(phenylmethyl) carbamodithioato- S,S']-	14726-36-4	U405
Barban	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester	101-27-9	U280
* * *	* * * * *		
Bendiocarb	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate	22781-23-3	P187
Bendiocarb phenol	1,3-Benzodioxol-4-ol, 2,2-dimethyl-	22961-82-6	U364
Benomyl	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-, methyl ester.	17804-35-2	U271
Bis(dibutylcarbamothioato) dioxodimolybdenum sulfurized.	Molybdenum, bis(dibutylcarbamothioato) dioxodi-, sulfurized	68412-26-0	U389
* * *	* * * * *		
Busan 40	Carbamodithioic acid, (hydroxymethyl)methyl-, monopotassium salt.	51026-28-9	U378
Butylate	Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester	2008-41-5	U392
* * *	* * * * *		
Butyl Tuads	Thioperoxydicarbonic diamide, tetrabutyl	1634-02-2	U402
Butyl Ziram	Zinc, bis (dibutylcarbamodithioato-S,S')-	136-23-2	U406
* * *	* * * * *		
Carbaryl	1-Naphthalenol, methylcarbamate	63-25-2	U279
Carbendazim	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester	10605-21-7	U372
Carbofuran	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate	1563-66-2	P127
Carbofuran phenol	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-	1563-38-8	U367
* * *	* * * * *		
Carbosulfan	Carbamic acid, [(dibutylamino)thio]methyl-, 2,3-dihydro- 2,2-dimethyl-7-benzofuranyl ester.	55285-14-8	P189
* * *	* * * * *		
Copper dimethyldithiocarbamate	Copper, bis(dimethylcarbamodithioato-S,S')-,	137-29-1	U393
* * *	* * * * *		
Cycloate	Carbamothioic acid, cyclohexylethyl-, S-ethyl ester	1134-23-2	U386
* * *	* * * * *		
Dazomet	2H-1,3,5-thiadiazine-2-thione, tetrahydro-3,5-dimethyl-	533-74-4	U366
* * *	* * * * *		
Dibam	Carbamodithioic acid, dimethyl-, sodium salt	128-04-1	U382
* * *	* * * * *		
Dimetilan	Carbamic acid, dimethyl-, 1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester.	644-64-4	P191
* * *	* * * * *		
Disulfiram	Thioperoxydicarbonic diamide, tetraethyl	97-77-8	U403

APPENDIX VIII TO PART 261.—HAZARDOUS CONSTITUENTS—Continued

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
* * *	* * *		*
EPTC (Eptam)	Carbamothioic acid, dipropyl-, S-ethyl ester	759-94-4	U390
* * *	* * *		*
Esprocarb	Carbamothioic acid, (1,2-dimethylpropyl) ethyl-, S-(phenylmethyl) ester.	85785-20-2	U388
* * *	* * *		*
Ethyl Ziram	Zinc, bis(diethylcarbamodithioato-S,S')-	14324-55-1	U407
* * *	* * *		*
Ferbam	Iron, tris(dimethylcarbamodithioato- S,S')-,	14484-64-1	U396
* * *	* * *		*
Formetanate hydrochloride	Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride.	23422-53-9	P198
* * *	* * *		*
Formparanate	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-.	17702-57-7	P197
* * *	* * *		*
Hercules AC-5727	Phenol, 3-(1-methylethyl), methyl carbamate	64-00-6	P202
* * *	* * *		*
Hexane	n-Hexane	110-54-3	K156
Hexazinone intermediate	Carbamic acid, [(dimethylamino)iminomethyl)] methyl, ethyl ester monohydrochloride.	65086-85-3	U371
* * *	* * *		*
Isolan	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester.	119-38-0	P192
* * *	* * *		*
Lead, bis(dipentyl carbamodithioato- S,S')-	Lead, bis(dipentylcarbamodithioato-S,S')-	36501-84-5	U397
* * *	* * *		*
Manganese dimethyldithiocarbamate	Manganese, bis(dimethyl carbamodithioato- S,S')-,	15339-36-3	P196
* * *	* * *		*
Metam Sodium	Carbamodithioic acid, methyl-, monosodium salt	137-42-8	U384
* * *	* * *		*
Methanol	Methyl alcohol	67-56-1	K156
* * *	* * *		*
Methiocarb	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate	2032-65-7	P199
* * *	* * *		*
Methyl bismate	Bismuth, tris(dimethylcarbamodithioato-S,S'-,	21260-46-8	U370
* * *	* * *		*
Methyl isobutyl ketone	4-Methyl-2-pentanone	108-10-1	K156
* * *	* * *		*
Metolcarb	Carbamic acid, methyl-, 3-methylphenyl ester	1129-41-5	P190
* * *	* * *		*
Mexacarbate	Phenol, 4-(dimethylamino)- 3,5-dimethyl-, methylcarbamate (ester).	315-18-4	P128
* * *	* * *		*
Molinate	1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ester	2212-67-1	U365
* * *	* * *		*
Nickel dibutyldithio carbamate	Nickel, bis(dibutyl carbamodi thioato-S,S')-	13927-77-0	U399

APPENDIX VIII TO PART 261.—HAZARDOUS CONSTITUENTS—Continued

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
* * *	* * *		*
Oxamyl	Ethanimidothioc acid, 2-(dimethylamino)-N-[[(methylamino) carbonyl] oxy]-2-oxo-, methyl ester.	23135-22-0	P194
* * *	* * *		*
Pebulate	Carbamothioic acid, butylethyl-, S-propyl ester	1114-71-2	U391
* * *	* * *		*
Physostigmine	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-.	57-47-6	P204
Physostigmine salicylate	Benzoic acid, 2-hydroxy, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1).	57-64-7	P188
* * *	* * *		*
Potassium dimethyl dithiocarbamate	Carbamodithioic acid, dimethyl, potassium salt	128-03-0	U383
Potassium n-methyldithiocarbamate	Carbamodithioic acid, methyl,-monopotassium salt	137-41-7	U377
Promecarb	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate	2631-37-0	P201
* * *	* * *		*
Propham	Carbamic acid, phenyl-, 1-methylethyl ester	122-42-9	U373
Propoxur	Phenol, 2-(1-methylethoxy)-, methylcarbamate	114-26-1	P199
* * *	* * *		*
Prosulfocarb	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester	52888-80-9	U387
* * *	* * *		*
Reactacrease 4-DEG	Ethanol, 2,2′-oxybis-, dicarbamate	5952-26-1	U395
* * *	* * *		*
Selenium dimethyldithiocarbamate	Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid.	144-34-3	U376
* * *	* * *		*
Sodium dibutyldithiocarbamate	Carbamodithioic acid, dibutyl, sodium salt	136-30-1	U379
Sodium diethyldithiocarbamate	Carbamodithioic acid, diethyl-, sodium salt	148-18-5	U381
* * *	* * *		*
Sulfads	Piperidine, 1,1′-(tetrathiodicarbonothioyl)-bis-	120-54-7	U400
Sulfallate	Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester	95-06-7	U277
* * *	* * *		*
Tetramethylthiuram monosulfide	Bis(dimethylthiocarbamoyl) sulfide	97-74-5	U401
* * *	* * *		*
Thiodicarb	Ethanimidothioic acid, N,N′-[thiobis[(methylimino) carbonyloxy]]bis-, dimethyl ester.	59669-26-0	P195
* * *	* * *		*
Thiophanate-methyl	Carbamic acid, [1,2- phenylenebis (iminocarbonothioyl)] bis-, dimethyl ester.	23564-05-8	P193
* * *	* * *		*
Tirpate	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino) carbonyl] oxime.	26419-73-8	P185
* * *	* * *		*
Triallate	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester.	2303-17-5	U389
* * *	* * *		*
Triethylamine	Ethanamine, N,N-diethyl-	121-44-8	U404
* * *	* * *		*
Troysan Polyphase	Carbamic acid, butyl-, 3-iodo-2-propynyl ester	55406-53-6	U375
* * *	* * *		*
U9069	Carbamic acid, [[3- [(dimethylamino)carbonyl]-2-pyridinyl]sulfonyl]-phenyl ester.	112006-94-7	U374

APPENDIX VIII TO PART 261.—HAZARDOUS CONSTITUENTS—Continued

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
* * *	* * *		*
Vanlube 7723	Carbamodithioic acid, dibutyl-, methylene ester	10254-57-6	U380
Vernolate	Carbamothioic acid, dipropyl-, S-propyl ester	1929-77-7	U385
* * *	* * *		*
m-Xylene	1,3-Dimethylbenzene	108-38-3	K156
o-Xylene	1,2-Dimethylbenzene	195-47-6	K156
p-Xylene	1,4-Dimethylbenzene	106-42-3	K156
* * *	* * *		*
Ziram	Zinc, bis(dimethylcarbamodithioato-S,S')- , (T-4)-	137-30-4	P204

* * * * *

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

7. The authority citation for part 271 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), and 6926.

8. Section 271.1(j) is amended by adding the following entry to Table 1 in chronological order by date of publication to read as follows.

§ 271.1 Purpose and scope.

* * * * *

(j) * * *

TABLE 1.—REGULATIONS IMPLEMENTING THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

Promulgation date	Title of regulation	Federal Register reference	Effective date
* * *	* * *	*	*
[Date of publication of final rule]	Listing Wastes from the Production of Carbamates	[Federal Register page numbers].	[Effective date of final rule].

* * * * *

PART 302—DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION

9. The authority citation for part 302 continues to read as follows:

Authority: 42 U.S.C. 9602, 9603, and 9604; 33 U.S.C. 1321 and 1361.

10. Section 302.4 is amended by adding the following entries in alphabetical order (by the first column) to Table 302.4, and by adding footnote "##" to the table to read as follows. The other appropriate footnotes to Table 302.4 are republished without change.

§ 302.4 Designation of hazardous substances.

* * * * *

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

[Note: All comments/notes are located at the end of this table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code+	RCRA waste No.	Category	Pounds (Kg)
* * *		*	*		*		*
Antimony, tris[bis(2-ethylhexyl)carbamodithioato-S,S']-, (Antimony tris(2-ethylhexyl)dithiocarbamate).	15991761	.....	*1	4	U369	.....	##

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All comments/notes are located at the end of this table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code+	RCRA waste No.	Category	Pounds (Kg)
Antimony, tris(dipentylcarbamodithioato-S,S')-(Antimony trisdipentyldithiocarbamate).	15890252	.....	*1	4	U368	.....	##
* * *	*	*	*	*	*	*	*
1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ester (Molinate).	2212671	.....	*1	4	U365	.....	##
* * *	*	*	*	*	*	*	*
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol).	22961826	.....	*1	4	U364	.....	##
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb).	22781233	.....	*1	4	P187	.....	##
* * *	*	*	*	*	*	*	*
7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-(Carbofuran phenol).	1563388	.....	*1	4	U367	.....	##
* * *	*	*	*	*	*	*	*
Benzoic acid, 2-hydroxy, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate).	57647	.....	*1	4	P188	.....	##
* * *	*	*	*	*	*	*	*
Bis(dimethylthiocarbamoyl) sulfide (Tetramethylthiuram monosulfide).	97745	.....	*1	4	U401	.....	##
* * *	*	*	*	*	*	*	*
Bismuth, tris(dimethylcarbamodithioato-S,S'-, (Methyl bismate).	21260468	.....	*1	4	U370	.....	##
* * *	*	*	*	*	*	*	*
Carbamates N.O.S	.....	.....	*1	4	U360	.....	##
Carbamic acid, butyl-, 3-iodo-2-propynyl ester (Troysan Polyphase).	55406536	.....	*1	4	U375	.....	##
Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl, methyl ester (Benomyl).	17804352	.....	*1	4	U271	.....	##
Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim).	10605217	.....	*1	4	U372	.....	##
Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban).	101279	.....	*1	4	U280	.....	##
Carbamic acid, [(dibutylamino)thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan).	55285148	.....	*1	4	P189	.....	##
Carbamic acid, [[3-[(dimethylamino)carbonyl]-2-pyridinyl]sulfonyl]-phenyl ester (U9069).	112006947	.....	*1	4	U374	.....	##
Carbamic acid, [(dimethylamino)iminomethyl)] ethyl ester monohydrochloride (Hexazinone intermediate).	65086853	.....	*1	4	U371	.....	##
Carbamic acid, dimethyl-,1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan).	644644	.....	*1	4	P191	.....	##
Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester (Isolan).	119380	.....	*1	4	P192	.....	##
* * *	*	*	*	*	*	*	*
Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb).	1129415	.....	*1	4	P190	.....	##
Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl).	23564058	.....	*1	4	P189	.....	##
Carbamic acid, phenyl-, 1-methylethyl ester (Propham).	122429	.....	*1	4	U373	.....	##
* * *	*	*	*	*	*	*	*
Carbamodithioic acid, dibutyl, sodium salt (Sodium dibutyldithiocarbamate).	136301	.....	*1	4	U379	.....	##
Carbamodithioic acid, dibutyl-, methylene ester (Vanlube 7723).	10254576	.....	*1	4	U380	.....	##
Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester (Sulfallate).	95067	.....	*1	4	U277	.....	##
Carbamodithioic acid, diethyl-, sodium salt (Sodium diethyldithiocarbamate).	148185	.....	*1	4	U381	.....	##

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All comments/notes are located at the end of this table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code+	RCRA waste No.	Category	Pounds (Kg)
Carbamodithioic acid, dimethyl, potassium salt (Potassium dimethyl dithiocarbamate).	128030	.....	*1		4 U383	.....	##
Carbamodithioic acid, dimethyl-, sodium salt (Dibam).	128041	.....	*1		4 U382	.....	##
Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid (Selenium dimethyldithiocarbamate).	144343	.....	*1		4 U376	.....	##
Carbamodithioic acid, (hydroxymethyl)methyl-, monopotassium salt (Busan 40).	51026289	.....	*1		4 U378	.....	##
Carbamodithioic acid, methyl,-monopotassium salt (Potassium n-methyldithiocarbamate).	137417	.....	*1		4 U377	.....	##
Carbamodithioic acid, methyl-, monosodium salt (Metam Sodium).	137428	.....	*1		4 U384	.....	##
* * *		*		*	*		*
Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester (Butylate).	2008415	.....	*1		4 U392	.....	##
* * *		*		*	*		*
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester (Triallate).	2303175	.....	*1		4 U389	.....	##
Carbamothioic acid, butylethyl-, S-propyl ester (Pebulate).	1114712	.....	*1		4 U391	.....	##
Carbamothioic acid, cyclohexylethyl-, S-ethyl ester (Cycloate).	1134232	.....	*1		4 U386	.....	##
Carbamothioic acid, (1,2-dimethylpropyl) ethyl-, S-(phenylmethyl) ester (Esprocarb).	85785202	.....	*1		4 U388	.....	##
Carbamothioic acid, dipropyl-, S-ethyl ester (EPTC (Eptam)).	759944	.....	*1		4 U390	.....	##
Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester (Prosulfocarb).	52888809	.....	*1		4 U387	.....	##
Carbamothioic acid, dipropyl-, S-propyl ester (Vernolate).	1929777	.....	*1		4 U385	.....	##
Carbamoyl Oximes N.O.S	.....	.....	*1		4 U361	.....	##
* * *		*		*	*		*
Copper, bis(dimethylcarbamodithioato-S,S')-(Copper dimethyldithiocarbamate).	137291	.....	*1		4 U393	.....	##
* * *		*		*	*		*
Dithiocarbamate acids, salts, and/or esters N.O.S., (This listing includes mixtures of one or more dithiocarbamate acid, salt, and/or ester.).	.....	.....	*1		4 U363	.....	##
1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)carbonyl]oxime (Tirpate).	26419738	.....	*1		4 P185	.....	##
* * *		*		*	*		*
Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester (A2213).	30558431	.....	*1		4 U394	.....	##
Ethanimidothioc acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl).	23135220	.....	*1		4 P194	.....	##
* * *		*		*	*		*
Ethanimidothioic acid, N,N'-[thiobis[(methylimino)carbonyloxy]]bis-, dimethyl ester (Thiodicarb).	59669260	.....	*1		4 P195	.....	##
* * *		*		*	*		*
Ethanol, 2,2'-oxybis-, dicarbamate (Reactacrease 4-DEG).	5952261	.....	*1		4 U395	.....	##
* * *		*		*	*		*
Iron, tris(dimethylcarbamodithioato-S,S')-(Ferbam).	14484641	.....	*1		4 U396	.....	##
* * *		*		*	*		*
Lead, bis(dipentylcarbamodithioato-S,S')-(Lead bisdipentyldithiocarbamate).	36501845	.....	*1		4 U397	.....	##
* * *		*		*	*		*
Manganese, bis(dimethylcarbamodithioato-S,S')-(Manganese dimethyldithiocarbamate).	15339363	.....	*1		4 P196	.....	##

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All comments/notes are located at the end of this table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code+	RCRA waste No.	Category	Pounds (Kg)
* * *		*		*	*		*
Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride).	23422539	.....	*1	4	P198	.....	##
Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-(Formparanate).	17702577	.....	*1	4	P197	.....	##
* * *		*		*	*		*
Molybdenum, bis(dibutylcarbamothioato)di-.mu.-oxodioxodi-, sulfurized.	68412260	.....	*1	4	U398	.....	##
* * *		*		*	*		*
Nickel, bis(dibutylcarbamodithioato-S,S')-(Nickel dibutyldithiocarbamate).	13927770	.....	*1	4	U399	.....	##
* * *		*		*	*		*
Phenol, 3-(1-methylethyl), methyl carbamate (Hercules AC–5727).	64006	.....	*1	4	P202	.....	##
Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb).	2631370	.....	*1	4	P201	.....	##
* * *		*		*	*		*
Piperidine, 1,1'-(tetrathiodicarbonothioyl)-bis-(Sulfads).	120547	.....	*1	4	U400	.....	##
* * *		*		*	*		*
Propanal, 2-methyl-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime (Aldicarb sulfone).	1646884	.....	*1	4	P203	.....	##
* * *		*		*	*		*
Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-(Physostigmine).	57476	.....	*1	4	P204	.....	##
* * *		*		*	*		*
2H-1,3,5-Thiadiazine-2-thione, tetrahydro-3,5-dimethyl-(Dazomet).	533744	.....	*1	4	U366	.....	##
Thiocarbamates N.O.S.	.....	.....	*1	4	U362	.....	##
* * *		*		*	*		*
Thioperoxydicarbonic diamide, tetrabutyl (Butyl Tuads).	1634022	.....	*1	4	U402		
Thioperoxydicarbonic diamide, tetraethyl (Disulfiram).	97778	.....	*1	4	U403	.....	##
* * *		*		*	*		*
Zinc, bis(dimethylcarbamodithioato-S,S')-, (Ziram).	137304	.....	*1	4	P205	.....	##
Zinc, bis(diethylcarbamodithioato-S,S')-(Ethyl Ziram).	14324551	.....	*1	4	U407	.....	##
Zinc, bis(dibutylcarbamodithioato-S,S')-(Butyl Ziram).	136232	.....	*1	4	U406	.....	##
Zinc, bis[bis(phenylmethyl)carbamodithioato-S,S']-(Arazate).	14726364	.....	*1	4	U405	.....	##
* * *		*		*	*		*
K156 Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes.	.....	.....	*1	4	K156	.....	##
K157 Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes (This listing does not include sludges derived from the treatment of these wastewaters).	.....	.....	*1	4	K157	.....	##
K158 Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes.	.....	.....	*1	4	K158	.....	##
K159 Organics from the treatment of thiocarbamate wastes.	.....	.....	*1	4	K159	.....	##

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All comments/notes are located at the end of this table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code+	RCRA waste No.	Category	Pounds (Kg)
K160 Solids (including filter wastes, separation solids, and spent catalysts) from the production of thiocarbamates and solids from the treatment of thiocarbamate wastes.	.....	.....	*1	4	K160	.....	##
K161 Purification solids (including filtration, evaporation, and centrifugation solids), baghouse dust, and floor sweepings from the production of dithiocarbamate acids and their salts (This listing does not include K125 or K126.).	.....	.....	*1	4	K161	.....	##

+—indicates the statutory source as defined by 1, 2, 3, and 4 below.
4—indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA section 3001.
*1—indicates that the 1-pound RQ is a CERCLA statutory RQ.
##—The Agency may adjust the statutory RQ for this hazardous substance in a future rulemaking; until then the statutory RQ applies.

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